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Evaluation of the alternatives of the European Deposit Insurance Scheme

Master's Thesis

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Abstract

The Banking Union, the Economic and Monetary Union's main reform during the recent crisis, is still unfinished without its third pillar, the European Deposit Insurance Scheme. The first two pillars have already ensured that the supervision and resolution of the banks are on the European level. However, the common deposit insurance is still a necessary element to fulfil the Banking Union's objective, to plausibly break the negative feedback loop between sovereigns and their domestic banking sector.

This reform, to effectively protect the depositors in the euro area, was put on hold because of the fear of many European member states that it would induce moral hazard and excessive risk-taking. Moral hazard in this setting means that both the member states and banks interests and behaviour may change in an undesirable way since the cost of bank failures will be socialized. In my thesis, I analyse the most favorable, but still attainable options of the European Deposit Insurance Scheme, and the ways to mitigate its drawbacks. In the analysis, I suggest feasible alternatives, necessary measures to lessen moral hazard, and inevitable fiscal back-stops to ensure the credibility of a common scheme.

Keywords Banking regulation; banking; European Deposit Insurance Scheme; EDIS; national deposit insurance; moral hazard; fiscal back-stop

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1 Introduction

One of the main reason why European countries were seriously affected during the recent crisis is the strong adverse feedback loop between banks and sovereigns (Véron, 2015). Failing banking sector jeopardizes the euro area member states mainly due to the costly bailouts, while on the other hand, unsustainably high public debt endangers banking sector because of their domestic exposure.

Europe's answer was the banking union to break this vicious banks-sovereign circle. The initiated main ways to achieve it are to transfer the responsibility of supervision to supranational level and to pool risks regarding to the resolution and deposit insurance. From these, the common supervision, the Single Supervisory Mechanism, and the common resolution, the Single Resolution Mechanism were already implemented (Véron, 2015). However, the intended third pillar, the common deposit insurance scheme has not been installed yet. The banking union will remain unfinished until this function is not transferred from national to supranational level since in a major crisis, bank failures and the related deposit payouts can put at risk the sovereigns. Another important long-term objective of the banking union is to decrease the fragmentation of the banking sector in the euro area. For this purpose, the common deposit insurance is indispensable.

Deposits are not only the main part of the households' financial assets, but also one of the most important source of the banks' funding in the eurozone (European Comission, 2015). Because of the different maturity structure of the assets and liabilities in the banks' balance sheet, even the otherwise solvent banks are exposed to bank runs (Diamond & Dybvig, 1983). The bank runs can seriously affect the whole economy and the sustainability of the public debt. Therefore, deposit insurance is a necessary part of every major economy's safety net. Deposit insurance schemes sole obligation is to protect deposits by paying out depositors and participating in resolution in case of bank failures. A credible deposit insurance by its pure existence is capable to stop bank panic by removing the depositors' incentives to withdraw in bank panics. Thus, the deposit insurance schemes have dual role both in crisis management and crisis prevention.

Nevertheless, in the recent crisis, the current system of national deposit insurance schemes were not able to fully prevent and stop bank panics in all the euro area countries (Gros & Schoenmaker, 2014). As the viability of the member states were questioned, also the credibility of the deposit insurance schemes is decreased.

Without adequate size and risk pooling on the European level, deposit insurance will remain a weak part of the banking sector's safety net. A further reason why the current system of deposit insurance is unjustifiable is the lack of consistency between it and the supranational supervision of banks. These two systems on different levels can cause several conflicts inside the euro area.

The European Commission has realized the need for a common deposit insurance hence it proposed the European Deposit Insurance Scheme (European Commission, 2015). This scheme, after an 8-year transitional period with continuously increasing risk-sharing, would have a steady-state full insurance system. This full insurance means that the national responsibilities of deposit protection would be entirely transferred to European level. Nevertheless, this proposal has met the resistance of many member states (Véron, 2015). They fear that this degree of risk-sharing would induce reckless behaviour both from the side of banks and member states.

In my thesis, I analyse the alternatives of a common deposit insurance scheme. I use the theoretical framework of deposit insurance presented by Diamond and Dybvig (1983) and model of moral hazard by Freixas and Rochet (2008). I compare the alternatives according to the pre-determined objectives. I also discuss extensively the problem of moral hazard and the possible ways to mitigate it. Moreover, I emphasize the need for a credible fiscal back-stop and the possible options to accomplish it.

Furthermore, I discuss the economically relevant questions about the implementation. I mainly pay attention to governance, transition and scope of the common deposit insurance scheme to find the most incentive compatible ways of implementation.

My topic has high practical relevance since a common scheme would mean substantial improvement in the current European crisis management framework and would be a significant step toward a more integrated Economic and Monetary Union. Currently, the proposal of the European Commission is under discussion without any specified launching date.

This thesis is organized as follows: section 2 overview the theoretical literature of financial intermediation, deposit insurance, contagion and moral hazard. Section 3 concentrates on the introduction of the empirical findings about the effects of deposit insurance. Section 4 gives an overall introduction of the deposit insurance schemes

and their features. Section 5 is about the current system of deposit insurance in Europe, the effects of the recent crisis and the banking union. Section 6 and 7 list the objectives and the prerequisites of a common scheme. Section 8 and 9 discuss and compare the relevant policy options. In section 10, I discuss the implementation of a common scheme, while finally in section 11, I conclude the thesis.

2 Literature review

In this section I will review the theory of deposit insurance and insurance pools. The study of deposit insurance and bank runs has been a topic that has interested economists for a long time. Questions such as deposit insurance makes financial markets safer by preventing bank runs or indeed it makes them more dangerous by stimulating banks to take more risks are very difficult to answer. Fortunately, several scholars dealt with these questions. Furthermore, I will analyse the theoretical model of the moral hazard of deposit insurance in a way to draw conclusions for the insurance of the national deposit insurance schemes.

2.1 Delegated monitoring and financial intermediaries

Banks and other financial intermediaries are the main source of external funds for the agents in the economy (Allen & Gale, 2007) and that's why it is important to understand their functioning.

Arrow and Debreu (1954) developed their general equilibrium model where they included time and uncertainty under the assumption of perfect competition (perfect monitoring, information and enforcement of contracts). Bankruptcy is assumed away through perfect monitoring (Arrow & Debreu, 1954) In the model, the so-called Arrow-Debreu securities are time and state dependent contingent claims. When these securities exist for all combinations of goods, time and state, then the two Walrasian welfare theorem holds. The contemporary financial theories differ from this model in that some of the above key assumptions do not hold. There can be incomplete contracts thus information frictions and bankruptcies are possible. Freixas and Rochet's (2008) example for incomplete contracts is that a firm's bankruptcy may trigger a bargaining process involving the claim holders. Diamond's (1984) model differs from Arrow and Debreu's model since contracts can be incomplete and non-verifiable. In the model of Diamond (1984), the sources of the bank's competitive advantages are the reduced monitoring costs and the diversification of loans within financial intermediation as shown in the model of delegated monitoring.

First let's understand the importance of delegated monitoring. Consider a borrower and many lenders. There is a cost of monitoring K and savings from monitoring S since monitoring allows for improved contracts. Without monitoring the borrower can simply inflate costs and report zero profit regardless of the value of

her project. The only sanction available for the lenders to enforce profit-sharing is liquidation, however extremely costly it is. The optimal contract without monitoring would mean that when no or small profits are reported the lenders would decide to liquidate the borrower's project rather than accept any payoff. Thus, the necessity of liquidation when the project is unsuccessful creates inefficiencies compared to monitoring since the optimal contract with monitoring on the other hand would ensure that the lenders don't have to liquidate. The reason is that they can observe whether the project is successful or not, and when no or small profit is reported the lenders would simply accept as much payoff as the firm can pay – which is more than if they would choose costly liquidation.

Now let's assume that each lender's capital to invest is small relative to the amount needed to fund the borrower's investment. There are multiple lenders per borrower m, so the total cost of monitoring is $m \cdot K$. Whether the monitoring has been undertaken or not is the agent's private information thus the monitoring now is unverifiable and costly.

Financial intermediaries can be a solution for the above problem through delegated monitoring. In the model, monitoring is outsourced for intermediaries and they are now basically synthetic large investors without monitored by lenders/ depositors. The cost of outsourcing should be less than the cost of $m \cdot K$ which is indeed the case when there are many investors with small amount of capital. $K + D \leq min[S, m \cdot K]$, where D denote delegation cost per borrower.

However, in this case diversification of intermediaries' loans are also critically important since a one loan bank would face the same incentives as the large borrower to report only zero profit. An example from Diamond (1996) helps us to easily see the benefits of diversification.

The value V of a project can be either high H (highly profitable) or low L (no profit, borrower can repay only the capital) with given distribution of success (see the table on the right) (Diamond, 1996). If there is a one loan bank, which is not monitored, the probability of a bank failure is 0.2 since the bank will be able to repay only the initial capital without interest to the lenders and it will be liquidated. This is the same as if the lenders would directly invest into the project. However, consider now that the bank raises capital to fund two independent investments. In this case, the bank can face three outcomes with the following probability: both loans

Table 1: Distribution of V

H	P=0.8
L	1-P=0.2

turn out to be successful $2P = 0.64$, only one of the loans is successful $2(1-P)P = 0.32$ or both loans are unsuccessful $2(1-P) = 0.04$. From these scenarios, even if one of the investments is successful, it ensures sufficient fund for the bank to cover its liabilities (borrowed amount plus interest after the two loans). Thus, the chance of bank failure is only 0.04 compared to the earlier 0.2 in the one investment case. In Diamond (1984)'s model, as the banks increase the number of investments, the chance of liquidation decreases.

The Diamond (1984) article has important implications. Diversification makes bank deposits safer than bank loans. If we assume fully diversified banks with independently distributed loans, the bank's deposits become almost riskless which would imply no need for deposit insurance. However, it is not the case in every model as I will introduce Diamond and Dybvig (1983)'s article in the following chapter.

2.2 Multiple equilibria of the bank deposit contract

Diamond and Dybvig (1983) article laid down the theoretical foundations of a deposit insurance.

Their analysis focuses on the multiple equilibria of the bank demand deposit contracts due to the maturity transformation service provided by the banks. They show that bank demand deposits can improve on an exchange market by providing better risk-sharing among lenders who need to consume at a different random times (Diamond & Dybvig, 1983). However, the demand deposit contract providing this improvement can have an undesirable equilibrium (a bank run) in which depositors panic and all of them withdraw immediately, including those who would prefer to keep their money in and consume later if they weren't concerned about the bank failing. The authors argue that even a rational depositor would withdraw in bad equilibria. Unfortunately, a bank run could cause that many healthy banks, which would be solvent on the long run, would fail, which cause banking crises and real economic problems since loans will be recalled and even solvent banks can fail which would further deepen the crisis.

Consider three time periods ($T = 0, 1, 2$), a single homogeneous good and productive technology with $R > 1$ unit of output in $T = 2$ for each unit input invested in $T = 0$. In the case when this productive production is interrupted in the first period, the liquidation value is just the initial investment 1. It is important to note that the liquidation is inefficient for the economy.

The banks' role in the model is that they are able to transform illiquid assets (productive technology) by offering liabilities with a different, smoother pattern of returns over time than the illiquid assets offer (Diamond & Dybvig, 1983).

The agents learn their type in period 1, and type 1 (2) agents excessively care only about consumption in $T = 1(2)$. Thus, letting c_k^i be consumption in period k of an agent who is of type i, the payoff for agents are the following: $c_1^1 = 1$, $c_2^1 = c_1^2 = 0$, $c_2^2 = R$. Further part of the asymmetric information problem is that agents can privately store at no cost.

The share of type 1 consumers is t. Let c_T represent goods to store or consume by agent in period T.

$$U(c_1, c_2; \theta) = \begin{cases} u(c_1) & if\ j\ is\ of\ type\ 1\ in\ state\ \theta \\ u(c_1 + c_2) & if\ j\ is\ of\ type\ 2\ in\ state\ \theta \end{cases}$$

where $u : /R_{++} \to /R$ is twice continuously differentiable, increasing, strictly concave, and satisfies Inada conditions $u'(\infty) = 0$ and $u'(0) = \infty$.

The first best would be possible if types were publicly observable. In an optimal insurance contract

$$u'(c_1^{1*}) = p \cdot R \cdot u'(c_2^{2*})$$

where $1 \geq p > R^{-1}$, marginal utility is equal to marginal productivity, and

$$t \cdot c_1^{1*} + [(1-t)c_2^{2*}/R] = 1$$

the resource constraint. Since $pR > 1$, and relative risk aversion exceeds 1, the above two equation implies that in optimum the consumption level is $c_1^{1*} > 1$ and $c_2^{2*} < R$. Hence, there is room for improvement compared to the competitive market equilibrium ($c_1^1 = 1, c_2^2 = R$). The banks can offer this improvement. They, in this model, provide an insurance in case of being a type 1 agent. The banks' demand deposit contract offer r_1 return for type 1 agents.

An important property of the demand deposit contract is the sequential service constraint which specifies that bank's payoff[1] to any agent can depend only on the agent's place in line (Diamond & Dybvig, 1983).

[1]The demand deposit contract's payoff function is V_t, which shows period t payoff per unit depending on the agent's place in line.

In this demand deposit contract setting, there are two pure strategy Nash equilibrium. First, the good equilibrium, which provides optimal risk-sharing, is when $r_1 = c_1^{1*}$ and type 1 agents withdraw at $T = 1$ while type 2 agents wait. The other, bad equilibrium (bank run) is when all agents panic and try to withdraw at $T = 1$. This bad equilibrium provides an allocation that is worse for every agent since all the productive technology $R > 1$ production is interrupted. In $T = 2$, the depositors who did not withdraw in $T = 1$ won't receive the high return because the reserves of the bank are exhausted. The necessary condition $r_1 > 1$, to improve on the competitive market equilibrium, makes the banks susceptible to run. This is because the face value of deposits is larger than the liquidation value of the bank's asset (Diamond & Dybvig, 1983). The reasoning behind the fact that there are two equilibriums is that agents choose to deposit even when there is a chance of bank run, if the probability of it is small enough.

The solutions that can prevent bank runs are the following ones: (i) suspension of convertibility and (ii) government deposit insurance.

(i) If banks can suspend convertibility when there are too many withdrawals in $T = 1$, then the anticipation of this suspension prevents runs by removing the incentive of type 2 agents to withdraw early. The mechanism of suspension of convertibility is that the banks can fix an upper bound of withdrawals $t = \hat{f}$. Since, early withdrawals receive strictly smaller payoff than they would get in the second period and a fund is still there for type 2 agents, these agents won't withdraw in the first period. The main problem with this method is that when t is stochastic then suspension of convertibility won't be optimal since when even the ex-ante determined upper bound is achieved $\hat{f}$, t still can be $t > \hat{f}$. In this case, when the upper limit was reached, no other agent can withdraw even though there are some type 1 agents not withdrew yet. Cross-border capital controls are considered a weaker, although in most cases longer lasting, form of suspension of convertibility (Ostry et al., 2012).

(ii) The idea of the deposit insurance is that it guarantees that the promised

$$V_1(f_j, r_1) = \begin{cases} r_1 & if\, f_j < r_1^{-1} \\ 0 & if\, f_j \geq r_1^{-1} \end{cases}$$

and

$$V_2(f, r_1) = max\left\{\frac{R(1 - r_1 f)}{(1 - f)}, 0\right\},$$

where f is the total number of demand deposits withdrawn and f_j is the number of withdrawers' deposits serviced before agent j as a fraction of total demand deposits.

returns will be paid to all agents regardless of the period in which they withdraw. In the Diamond and Dybvig (1983)'s model, the government is assumed to be able to levy any tax that would charge every agent the same amount. This means that the government would tax those agents who withdrew in $T = 1$. The rate of tax depends on f and r_1.

Compared to suspension of convertibility, the government deposit insurance also works when t is stochastic. So, the demand deposit contract with government deposit insurance represents a dominant strategy equilibrium. Thus, it increases depositors' confidence, prevents bank runs and brings bank stability.

However, bank runs are not just panic based can be but also as a result of aggregate loan risk and asymmetric information about loan payoffs (Bryant, 1980). Both in Bryant (1980)'s and Diamond and Dybvig (1983)'s article the consumers have random liquidity demands, and the deposit contract insures them against this risk.

In Bryant (1980)'s model, there are two types of individuals who live two periods. The number of type one (two) individuals is $N(z) = N$ $(n(z) = n)$ for all $z \in [0, 1]$, where $N > n$. The difference between the two type of individuals that the type ones are endowed with $NK > 0$ units of single non-storable but transferable consumption good in their first period of life but with nothing in $T = 2$. The type twos are endowed with $nK > 0$ in $T = 2$ but with nothing in $T = 1$.

Furthermore, the author introduces similar uninsurable demand for liquidity as Diamond and Dybvig (1983) thus α percent of deposits should be held as fiat money by the bank to be able to pay out the early withdrawers. This way, again similarly to Diamond and Dybvig (1983), the intermediary reduces the idiosyncratic risk faced by individuals by the deposit contract.

A different point in Bryant (1980)'s work is that intermediary assets are risky. The type two individuals' endowment is risky: it can be less than $nK > 0$ with small probabilty. This riskiness is reflected in the loan- and deposits rates too. The author assumes that β percentage of type one individuals will realize when the bad outcomel happens. These individuals react by withdrawing their money similarly to those α individuals who affected by the idiosyncratic liquidity shock. This will cause a bank run since the banks only keep α and not $\alpha + \beta$ percent as reserves.

According to Bryant (1980), the value of the government deposit insurance is in that it is more favorable for the society that the government occasionally prints

money and handles the crisis than for intermediaries to store $\alpha+\beta$ percent as reserves in every period.

The main difference between the two above articels is that in Diamond and Dybvig (1983) the crises is originated solely from a random panic while in Bryant (1980) from the problematic intermediary assets. This difference has further consequnces for the policy makers. In the first case, there should be no cost for the government from the deposit insurance since the banks only need liqudity. In the second case, when there is insolvency, there are fiscal costs for the state.

In addition to the deposit insurance, another measure to decrease the chances of a bank run is to increase the capital requirements of the banks (Freixas & Rochet, 2008). Admati and Hellwig (2013) argue that equity only seems to be more expensive for the banks because of the government subsidies, such as deposit insurance, enable them to borrow at lower costs rather than to increase their equity. The authors claim that capital regulation is an effective way to counter incentives for recklessness and decrease excessive leverage. They recommend equity requirements be set at 30 per cent of bank's total assets (Admati & Hellwig, 2013).

It is worth mentioning that also a well functioning interbank markets can provide a solution to stop bank runs when the solvency of the bank is not in question and there is trust in the financial system (Freixas & Rochet, 2008). However, as we will see in the next chapter, interbank markets can be the source of the problem too. Similarly to the interbank markets, the LOLR function's of the central bank can help to stop bank runs with providing liqudity but only when the banks are solvent.

2.3 Contagion between financial intermediaries

Allen and Gale (2000) provides the microeconomic foundations of failure of solvent banks due to interbank contagion in incomplete market structure. They use similar setting as in Diamond and Dybvig (1983)'s article. However, unlike to it, in Allen and Gale (2000)'s model there are more banks. The authors highlight that in their model the incompleteness of the market structure plays a significant role in the bank runs. The model can be applied not only to banks but also to member states' financial sector in an incomplete monetary union. In an incomplete monetary union, banks reside with substantial cross-border activity in the member states, however in a crisis the capital and liquidity flow would halt or even restricted by member

states.

In Allen and Gale's model, there are four banks (or interchangeably member states' financial sector). A liquidity shock occurs in one of the regions and it spreads by the incomplete pattern of the linkages in the interbank market. In the paper, the authors make a distinction between the complete market structure (i.e. every bank/state has exposure to all other banks/states) and incomplete market structure (i.e. banks/states are exposed only to neighbouring bank/state) (Allen & Gale, 2000).

Consider three dates $T = 0, 1, 2$ and a single good, which can be consumed and invested in two types of assets (in a liquid and an illiquid asset). The liquidation value of the illiquid asset is $r < 1$.

In Allen and Gale (2000) the four ex ante identical member states have a continuum of ex ante identical consumers. First, endowment is equal to one unit of good at $T = 0$ and the utility function is

$$U(c_1, c_2) = \begin{cases} (u(c_1) & with\, probability\, \omega \\ u(c_2) & with\, probability\, 1 - \omega \end{cases}$$

where c_t denotes consumption at date $T = 1, 2$.

In the equation, the probability ω varies across member states' financial sector and denote the probability of being an early consumer. ω has two type of possible values, a high ω_H and ω_L.

There are two equally likely situation S_1 and S_2. The difference between the situation is the distribution of the level of liquidity shock (early and late consumers) ω.

The optimal risk-sharing in this setting is achievable even when the planner cannot observe the consumers' type since the first best allocation maximise the objective function $\gamma \cdot u(c_1) + (1 - \gamma) \cdot u(c_2)$, where $\gamma = (\omega_H + \omega_L)/2$, subject to the feasibility constraint $x + y \leq 1$, resource constrains $T = 1 : \gamma \cdot c_1 < y$ and $T = 2 : (1 - \gamma)c_2 \leq R \cdot x$, and incentive constraint $c_1 \leq c_2$.

However, this incentive-efficient allocation cannot be achieved in decentralized setting because of the distribution of ω. In this setting, the banks make the investment decisions since each consumer deposits her endowment of one unit of consumption good in the banks. The banks invest and offer deposit contract (c_1^i, c_2^i)

that allows the depositor to withdraw either c_1^i units of consumption at period 1 or c_2^i at period 2. The above investment portfolio satisfies the bank's budget constraint $x + y \leq 1$ at $T = 1$, however it will not satisfy the budget constraint at the second date. Unlike the planner, the bank must consider the case that the fraction of early consumers in his region is high ω_H and it will need more than y to satisfy the early consumers and has to liquidate some of its illiquid asset for r. A bank must keep at least $(\omega_H)c_1/R$ units of the long asset to satisfy the late consumers. However, when r, the liquidation value is small enough, it can cause bank runs since there won't be enough buffer to satisfy the needs of late consumers c_2. The amount of the long asset that can be used as a buffer at period 1 is $r\left(x - \frac{(\omega_H)c_1}{R}, 0\right)$ without causing a bank run.

The interbank market can be the solution for the above problem. Hence the average probability of different type of consumers is $\gamma = (\omega_H + \omega_L)/2$, there will be states with low number of early consumer ω_L who can help the ω_H states with liquidity even in case of an incomplete market structure.

Now consider a case when there is a third state $\overline{S}$, which occurs with negligible probability so the agents don't plan with it. This represents the financial fragility in the system since in this case the demand for liquidity in $T = 1$ is greater than the banks' ability to supply it without causing a run. In this case, it will be easy to see the fragility of the incomplete market structure. First, there is an initial shock in region A. There is insufficient buffer, and if the shock ϵ is enough great and the liquidation value r is enough small the bank A will go bankrupt. Since bank B has claims from bank A, bank C from bank B and bank D from bank C, the failure of one bank will cause the failure of the whole banking system. However, in a complete market structure this failure would happen with smaller probability since each region is connected to all other regions and they can jointly provide liquidity to the affected region. In case of incomplete market structure, the vicious circle could be break with the help of liquidity assistance.

The contagion effect is the reason that even one bank's or a member state's financial sector's failure can be extremely costly since it can trigger other banks or member states' financial sectors to fail. In the literature, there are many different ways suggested how contagion might happen. Above I described one example by Allen and Gale (2000) in which contagion arises from the overlapping claims in the banking sector. A further examples of source of contagion is from Ferrucci, Gianluigi, & Shin (2005). Their model incorporates direct balance sheet interlinkages among

financial institutions and contagion via sudden drop in asset prices. They extensively focus on the later channel. After an initial shock, changes in asset prices can induce disposal of assets, which, if the market's demand is not perfectly elastic, will have further negative impact on market prices, thereby again deteriorating the financial intermediaries position. Thus, contagion can result even from relatively small shocks adversely affecting asset prices.

2.4 Moral hazard and deposit insurance

Diamond and Dybvig (1983) states that deposit insurance has no "cost" but as (Freixas & Rochet, 2008) pointed out there is a moral hazard problem with this type of government insurance. Moral hazard occurs when the provision of insurance changes the individual's behaviour in an undesirable way. In the case of deposit insurance, the incentive of the individuals to monitor their banks is removed. Kareken and Wallace (1978) argues that deposit insurance has negative effect on the banking industry. Their model is based on the idea that sub-optimally priced deposit insurance causes distortions in the banks' portfolio which cause instability in the banking industry. Due to deposit insurance, banks become risky and grow bigger and bigger until some of them probably fail and then the taxpayers must compensate for the loss. This approach tells us that deposit insurance might create financial crisis.

The same moral hazard problem applies to the insurance of national deposit insurance schemes. In this case, not only banks' but also member states behaviour will change in an undesirable way. Member states are incentivized to apply riskier measures to boost their banking sector to increase their tax revenue and and gain from increased employment and credit expansion since other member states will compensate for the bank failures. Thus, policies to limit the consequences of the moral hazard of a common deposit insurance should be considered on national level too. Nevertheless, tax competition among member states can limit their direct profit through taxes from the expanded banking sector. The member states are less incentivized if the costs related to the bank failure are collected on supranational level.

Freixas and Rochet (2008) introduce a simple model to illustrate the moral hazard issue. It is a static model with only two dates. At $T = 0$ the premium after deposit insurance is paid by the bank. At $T = 1$ the bank is liquidated, and its depositors are compensated from the deposit insurance fund whenever the bank's

assets are insufficient.

At $T = 1$ the stockholders receive the liquidation value of the bank.

$$\tilde{V} = \tilde{L} - D + \tilde{S},$$

where $\tilde{L}$ is loan repayments, D is deposits and $\tilde{S}$ is the payment from deposit insurance $\tilde{S} = max(0, D - \tilde{L})$.

The D can be written as $L+P-E$, where L is loans, P is insurance premium and E is equity, so $\tilde{V}$ can be expressed as

$$\tilde{V} = E + (\tilde{L} - L) + (max(0, D - \tilde{L}) - P)$$

This means that the shareholders' value of the bank equals the sum of its initial value, the increase or decrease in the value of loans, and the net subsidy from the deposit insurance.

Assume now that $\tilde{L}$ can take two values: X with probability θ and 0 with probability $(1 - \theta)$. Thus the expected value of the bank's shares is

$$\Pi \stackrel{\text{def}}{=} E(\tilde{V}) - E = (\theta \cdot X - L) + ((1 - \theta) \cdot D - P) \tag{1}$$

From the above equation the first term shows the net present value of the loan, while the second is the net subsidy from the deposit insurance scheme. The moral hazad problem can be easily seen from the (1) in the case of flat-rate deposit insurance. A flat-rate deposit insurance is when the premium P after the insurance depends only on the volume of the deposits at the bank and not on the level of the risk of the bank's assets (Allen & Gale, 2007). Moreover the banks can determine the values of (θ, X) in a given feasible set since they can decide in which project to invest. This results in banks choosing investments with highest risk or the lowest probability of θ.

In the following, I will present a slightly modified format of Freixas and Rochet (2008) to show the moral hazard of insurance of national deposit insurance schemes. It is also a static model with two dates. At $T = 0$ the banks decide between risky and safe investments. At $T = 1$ the banks are either liquidated or on the contrary to Freixas and Rochet (2008) they have to pay the deposit insurance premium. In case of liquidation, the depositors are compensated from the deposit insurance fund whenever the bank's assets are insufficient.

I add taxes t to the model. These taxes represent a given percentage and are paid by the banks to the national governments after the value of their assets A. So

as A increases, the government revenue At also increases. The banks have to pay the taxes t at $T = 1$.

For simplicity, I assume that banks have only loans L as assets thus $A(-P) - At = L(-P) - Lt$ at $T = 1$ after the taxes and the ex-post deposit insurance premium P are paid, whenever it is needed. On the liability side, banks have deposits D and equity E thus the whole balance sheet equation is $A(-P) - At = L(-P) - Lt = D + E(-P) - Dt$. Moreover, I also assume that after liquidation of a bank, the depositors, who get their money either from the bank or the deposit insurance fund, will again deposit their money in another bank in the same country.

Assume now that the whole banking sector can choose between two kind of projects at $T = 0$ and all of the banks will have at least one projects. Risky projects with L either increases by X with probability θ and takes 0 with probability $(1-\theta)$ or safe projects L either increases by x with probability γ and takes 0 with probability $(1 - \gamma)$, where $X > x > 0$ and $\gamma > \theta$.

In case of a bank failure, when L takes the value 0 and the bank is not able to pay out its depositors, the deposit insurance fund needs to step in and pays out the depositors. The P ex-post deposit insurance premium for the other banks will then be $\frac{D}{n-1}$, where n is the number of the banks at national level. For simplicity, I assume that all the banks will pay the same amount of deposit insurance premium regardless their size. They will not pay after the amount of covered deposits.

Now when there is a common deposit insurance, the number of the banks are N, where $N>n$, than P is $\frac{D}{N-1}$ thus smaller than in the previous case.

In the above modified settings, the banks' incentives do not change compared to Freixas and Rochet (2008). They will still choose investments with highest risk.

In the following, I will analyse the governments' incentives in case of a common insurance. In my analysis, I will consider the whole banking sector, and I assume first that all the banks outside the member state will choose to invest in extra safe assets with zero chance of failure.

In case when banks chose risky projects, the exact cost of failures for the banking system in the given member state at $T = 1$ is $\{P\theta n + [E(1 - \theta)n]\}$, where $P = \frac{(1-\theta)Dn}{[N-(1-\theta)n]}$. The first part, $P\theta n$, is the deposit insurance premium paid by all the successful banks in the member state after all the failed banks, while the second part, $E(1 - \theta)n$, is the sum of the lost equities after the failures. The P has simply changed according to the number of failures.

Thus the total change in the banking sector's value in the member state is

$$(X \cdot A \cdot n \cdot \theta) - \{P\theta n + [(1-\theta)E]\}, \tag{2}$$

where $(X \cdot A \cdot n \cdot \theta)$ is the value increase from all the banks with successful risky projects and the second part is the above described cost of failures. Note that taxes haven't been paid yet.

Similarly, in the case when banks chose safer projects, the total change in the banking sector's value in the member state is

$$(x \cdot A \cdot n \cdot \gamma) - \{P\gamma n + [(1-\gamma)E]\}, \tag{3}$$

The government's motive is to increase its tax revenue. Whenever (2) is positive and n compared to N is small enough, the government revenue will be higher as banks choose riskier projects. Thus, the government will be motivated to encourage their banking sector to take more risk since the direct (bank taxes) and indirect gains (jobs and credits) will remain in the country while the cost of failures are socialized. Although, the direct gains are limited when there is significant tax competition. The governments can incentivize the domestic banks through different national legalisation, policies or government ownership to take higher risks. Furthermore, it can be seen that as the number of the banks in the nation is smaller compared to the number of banks in the common fund, the sovereigns' interest to encourage banks to take higher risk is increased since losses are more socialized.

A further way to analyse the relationship between risk-sharing and moral hazard is presented by Persson and Tabellini (1996). They explicitly focus on this trade-off in a fiscal union setting. In their model, an insurance, such as deposit insurance, provided by a fiscal union, shares the international risk, and therefore reduces the incentives of member states to pursue structural reforms or might even incentivizes them to enact policies that increases local risk.

In their model, consider two member states populated by a continuum of risk-averse individuals, who share the same basic concave preference function for consumption. The income of the individual i is 1 with probability p^i and *zero* with probability $(1-p^i)$. The income is not verifiable. The fraction of individuals with income is denoted by p which can take two values: γ with probability θ and β with probability $(1-\theta)$, where $\beta < \gamma$. The value of p is depends on the aggregate risk.

This risk can be modified by a policy which is chosen by majority rule before the p is observed. The p has two components. First, there is a government run

social insurance policy (unemployment insurance or in a slightly changed setting deposit insurance if the individuals deposit their income in banks) contingent on the aggregate state p, which redistributes between individuals with and without income, $c(p)$ and $b(p)$. Second, g represents the amount of resources reserved for public investment (structural reforms which improve the economy's adjustment to macroeconomic shocks), which increase the probability of γ (good aggregate state). Therefore, the probability θ is an increasing and concave function of g.

Combining the social insurance and public investment, the per capita resource constraint in state p is:

$$p = pc(p) + (1-p)p(b) + g$$

Thus, the feasible policy in political equilibrium is a nonnegative vector of $[p(c), p(b), g]$ chosed by individuals based on their expected utility.

For the two ex-ante identical countries, there are four possible states of aggregate output $Y(p, p^*)$, where * represents the foreign-country variables.

$$\begin{aligned}
&Y(\gamma,\gamma) = 2\gamma && \text{with probability } \theta(g)\theta(g^*)\\
&Y(\gamma,\beta) = \gamma+\beta && \text{with probability } \theta(g)(1-\theta(g^*))\\
&Y(\beta,\gamma) = \beta+\gamma && \text{with probability } (1-\theta(g))\theta(g^*)\\
&Y(\beta,\beta) = 2\beta && \text{with probability } (1-\theta(g))(1-\theta(g^*))
\end{aligned}$$

From the above options, the member state could share the output risks in the second and third situations by intergovernment transfers denoted by τ (Persson & Tabellini, 1996). The amount of the transfers equals τ fraction of the excess national output over the average output in the two countries, $\tau(p-p^*)/2$. The first best, to cooperatively decide on policies, cannot be achieved because of the imperfect verifiability of national policies. The authors analyse a noncooperative constitutional arrangements as possible second-best option. In this arrangement, the member states do not internalize the effect of national policies g on the other country. The individuals choose the national policies (to determine $p(c), p(d),$ and g) and confederative policy (to determine the intergovernmental transfers τ) simultaneously. In this setting, the risk sharing can exacerbate the moral hazard as countries have less incentives to invest in national policies g to increase their capacity to adjust shocks (Persson & Tabellini, 1996).

The above models show that common deposit insurance can alter governments behaviour. Unfortunately, because of incomplete information problem, the

common insurer cannot write a perfect contract in which she specifies all the actions the governments need to undertake.

Persson and Tabellini (1996) recommend centralization to counteract the moral hazard in their model. This centralization can be either a different constitutional arrangement with modified voting timing and commitment to risk-sharing or an endogenous delegation to a federal policymaker in charge of insurance.

In general, Shavell (1979) discusses two different methods to ensure prudent behaviour. First, incomplete insurance coverage exposes governments to greater risk, therefore can ensure proper incentives. Second, the monitoring and supervision by the insurer can also induce more liable actions from governments to prevent losses. However, these solutions can only partially eliminate the problem. The incomplete coverage by its own attribution, that it incompletely covers, cannot be the perfect method. In addition, the common insurer hardly can have ex-ante accurate observations. Thus even in case of supervision and incomplete common coverage, the governments would have incentives to encourage banks to take higher risks (Shavell, 1979).

Merton (1977) discusses risk-based deposit insurance as a solution for bank's moral hazard. Risk-based deposit insurance means that the premium P is adjusted to the riskiness of bank's assets and not only depends on the volume of deposits. Merton views deposit insurance payment as a put option on bank's assets and he argues that this arbitrage pricing method can be used for an adequate pricing policy. His result is that the rate of P/D of the deposit insurance is an increasing function of the deposit-to-asset ratio and of the volatility of the bank's assets. However, this method needs the assumption of complete markets. Freixas and Rochet (2008) assert that it is more reasonable to assume incomplete financial markets thus they suggest another pricing method. The NPV of the contract can be computed based on a risk-adjusted measures.

Chan, Greenbaum, and Thakor (1992) talk about two issues how fairly a deposit insurance can be priced. First is timing. Even in the case when the portfolio decisions of a bank are observable, there is a time lag between these portfolio decisions and the determination of the deposit insurance premium which makes it hard for the policy maker to price fairly. Second issue is adverse selection because of asymmetric information. The above two issues result that even if fairly priced deposit insurance is possible it may wouldn't be optimal since it would be inconsistent with incentive compatibility.

Furthermore, I describe two macro-prudential policies which theoretically could limit the consequences of moral hazard generated by deposit insurance. The first is deposit rate regulation which was used in the U.S. and is also discussed in the article of Hellmann, Murdock and Stiglitz (2000). This method could counterbalance the excessive risk-taking of the banks by providing high charter value and limiting the interest rate of loans. As a result, banks invest in less risky projects thus this method would increase the stability of the banking system. Nevertheless, deposit rate regulation can jeopardize the competition in the banking sector by the ceilings on the rates.

Second, capital requirements can also provide a solution to the excessive risk-taking generated by deposit insurance. By its pure existence, it reduces the risks: the shareholders have more incentives to encourage banks to choose less risky project to avoid large losses in case of failure and as the capital buffer is higher, the chance of default is smaller (Freixas & Rochet, 2008). The main disadvantage of the capital requirements is that equity increases the cost of lending and causes a decline in economic investment and growth. However, Admati and Hellwig (2013) argue that based on Modigliani-Miller theorem capital requirements shouldn't affect the total cost of lending. They claim that equity only seems to be more expensive for the banks because public insurance enables them to borrow at low costs.

In the chapter above I discussed the liquidity and monitoring services provided by the banks as a reason for their existence. I also summarized the incompatible side of financial intermediaries and the consequences of it, and how can a deposit insurance provide a solution for them. Furthermore, I explored the negative sides of the deposit insurance and the ways of mitigations. I also analysed the moral hazard in case of insurance of national deposit insurance schemes.

2.5 Insurance pools and risk-sharing

Insurance pools are used by private financial institutions to insure extraordinary large risks which could not be insured by a stand-alone company. Insurance pools are basically an agreement between insurers to jointly assume risks based on percentages, however these agreements exist in many heterogenous form and can have many distinct features (E&Y, 2014). The potential advantages are to reduce counterparty risks by facing more insurer and to be able to insure particularly large risks that occur infrequently such as nuclear or environmental catastrophes (Inderst, 2016).

In the latter case, this type of insurance agreement may the only viable alternative. This form of risk sharing produce efficiencies such as risk diversification, knowledge sharing, and lower insurance costs and premiums (Inderst, 2016). Nevertheless, by knowledge sharing and cooperation, the competitiveness of the insurance market can by harmed which might on the contrary cause increased insurance premiums (E&Y, 2014).

3 Empirical research review

In the following part, I review the empirical literature of the deposit insurance. Numerous scholars have tried to investigate the effect of deposit insurance on financial system stability, development and market discipline. The question is whether the moral hazard or the preventive effect from the bank runs dominates. When deposit insurance is introduced, market discipline tends to shrink since depositors in case of failure are covered by national funds. However, the other element of the trade-off is that in times of crisis deposit insurance can maintain trust in the banking sector and prevent bank runs. The difficulty to answer the question is that the features of the deposit insurance schemes and institutional environment greatly vary from country to country. Other challenges are the problem of reverse causality and endogeneity that there are factors that jointly influence the characteristics of deposit insurance, the probability of bank runs and financial development.

In the studies, one of the marked conclusions is that the quality of the institutional environment (banking regulation and legal environment) is really important factor to limit the negative consequences of the moral hazard. Even the same deposit insurance features might have different effects in different institutional environment.

Further broad conclusion is that explicit deposit insurance schemes (clearly defined in the legal environment and ex-ante funded) are more effective than implicit schemes.

Moreover, most of the studies showed that deposit insurance can induce serious moral hazard problems and greatly decrease the market discipline. In some cases, the authors even concluded that the negative effects dominate over the positive ones.

Below, I will shortly describe several studies in two parts. First, I collected those major studies which examine the effect on banking system stability. In the second part, the studies focus on the effect of deposit insurance on market discipline.

3.1 Effect on banking system stability

One of the main reasons to install a deposit insurance scheme is that it is believed that the stability of the banking system will increase since bank runs are less likely to happen in the presence of deposit insurance.

Asli Demirgüç-Kunt and Enrica Detragiache (2002) have studied the impact of deposit insurance in times of banking crises. Their study covers evidence for 61 countries in 1980-97 and uses a multivariate logit model with many explanatory and control variables to find out whether deposit insurance increases or decreases the probability of banking crises. The authors found that variations in the features of the deposit insurance schemes such as more extensive coverage, ex-ante funding or government management increases the adverse moral hazard impact of the schemes. Outside factors such as deregulated bank interest rates and weak institutional environment increases the likelihood of banking crisis.

The increased risk-taking by banks in economic booms due to deposit insurance was confirmed by Asli Demirguc-Kunt and Enrica Detragiache (2002). Deniz Anginer, Asli Demirgüç-Kunt and Min Zhu (2014) made a similar follow-up study to analyse the effects during the recent financial crisis and the years preceding it (2004-2012) on banks' risk-taking. The authors find that banking system is more stable when deposit insurance scheme is installed. During a financial crisis, the stabilizing effect of the deposit insurance dominates. The authors argue that supervision and prudential regulation are important factors to limit the negative effects of deposit insurance schemes.

In the study, the authors used a comprehensive cross-country database, including a variety of deposit insurance features, compiled by Demirgüç-Kunt, Karacaovali, and Laeven (2005) and was updated in 2013.

3.2 Effect on financial development

Robert Cull, Lemma Senbet and Marco Sorge (2004) not only tested the relationship between deposit insurance and banking system stability but also on growth of bank intermediation. Their study focuses on the long-run impacts of the features of the deposit insurance on bank intermediation. They find that generous deposit insurance has negative impact both on the stability of banking system and the long-run growth in countries lacking suitable supervision and rules of law.

3.3 Effect on market discipline

When deposit insurance is installed, the market discipline tends to decrease as depositors do not longer monitor banks and bear the losses in case of failure. The lack

of market discipline leads also to excessive risk taking.

Asli Demirgüç-Kunt and Harry Huizinga (2004) investigated the relationship between market discipline and deposit insurance. Using cross-country dataset, the authors find that deposit insurance reduces required interest rates by depositors since banks do not have to compensate fully for their risk-taking.

Reint Gropp and Jukka Vesala (2000)'s study focuses on the EU banking sector. They evaluate the level of moral hazard created by deposit insurance. The authors argue that implicit deposit insurance creates higher potential for moral hazard than explicit scheme. The reason is that even though implicit insurance carries uncertainty, the implicit schemes may cover not only depositors but larger set of bank stakeholders whose monitoring effort could reduce increased risk-taking. Relating to this study, Reint Gropp and Jukka Vesala (2004) confirm that a credible bail-in regulation can reduce the moral hazard associated with deposit insurance.

4 Deposit insurance in general

The first deposit insurance scheme was introduced in the United States. During the Great Depression, The Glass–Steagall Act of 1933 installed the federal deposit insurance (FDIC), in addition to the separation of commercial and investment banking operations, after many state level deposit insurance schemes went bankrupt. The reasons of the bankruptcies were the inadequate size and lack of risk-sharing among insurers. Similarly to the eurozone, the US had a central bank for twenty years before the installation of the FDIC. Since 1933, the FDIC has resolved thousands of banks. Just in 2009, at the peak of the Great Recession, it had to intervene in about 150 banks. The resolutions are mostly financed by the provision fees and its interest on assets, however the FDIC can borrow up to $ 500 billion from the Treasury if the Treasury, the Federal Reserve and the White House approved it. (Aizenman, 2012) After the Savings and Loan crisis and the banking crisis in Sweden in the 1980s and 1990s, the International Monetary Fund has started to recommend deposit insurance as a necessary instrument for financial safety (Demirgüç-Kunt et al., 2013). Figure 2 shows the rapid development of the number of explicit deposit insurance schemes worldwide from 1933. In 2013, 112 countries had explicit deposit insurance.

Deposit insurances can have many different features and forms: explicit-implicit, private-public, compulsory-voluntary, ex-ante funded, with co-insurance, flat-rate or risk-based assessment fees, etc. (Demirgüç-Kunt et al., 2008) One of the most significant difference from these is whether the insurance is explicit or implicit. Explicit insurance means that laws describe in a detailed way how a deposit insurance works. The coverage limit, the payout delay and the frame of funding are all clarified. On the other hand, implicit deposit insurance is when the laws concerning the deposit insurance do not exist and the government's protection of the depositors is discretionary (Demirgüç-Kunt et al., 2008). The main advantage of an explicit scheme is the increased financial safety during a crisis. However, the scheme creates moral hazard with potential devastating consequences on the long term. In addition to the moral hazard, an implicit scheme also cause uncertainty due to the lack of exact legal background. Furthermore, most of the deposit insurance schemes are public, though there are some counterexamples. In Germany and Austria, in addition to the public insurance, there is a voluntary private deposit insurance, so-called Institutional Protection Schemes, which goes beyond the public coverage limit (European Commission, 2010). Another difference is whether a scheme is voluntary or compulsory. In Europe all the public schemes are compulsory in order to

avoid adverse selection of problematic banks (Demirgüç-Kunt et al., 2013). Deposit insurances can apply flat-rate or risk-based provision fees. The risk-based fees are more optimal since they limit the moral hazard (Merton, 1977).

When banks fail and are not capable to repay the entitled depositors' claim, the deposit insurance scheme pays out the depositors. An explicit scheme pays out until an ex-ante determined threshold in a short period with available funds and if necessary, with immediate ex-post contributions. In this case, the deposit insurance scheme is a liquidity provider. (Freixas & Rochet, 2008) In the subsequent bank resolution, the authorities try to recover the amount of covered deposits. If the required amount cannot be fully recouped from the insolvency proceedings, the deposit insurance fund needs to absorb the losses and raise long-term contribution from the banking sector (Freixas & Rochet, 2008).

5 Deposit insurance in the EU

In the following part, I discuss the current regulation of the deposit insurance schemes in the EU, and how these schemes managed to tackle the recent crisis. I also analyse why the loop between sovereigns and banks proved to be so vicious. Furthermore, I introduce European Union's answer to the problem, to how to break this vicious circle, the banking union.

5.1 Current regulation

The EU started to harmonize its member states' deposit insurance scheme first in the Directive 94/19/EC. It ensured only minimal harmonization. Different funding schemes were still allowed but at least all the member states had their own scheme. After the global financial crisis broke out, a new Directive 09/14/EC entered into force. It increased stepwise the protection limit to €100,000 from €20,000 per individual per bank in every country. The legislation introduced the so called temporary high balance case related to specific life events such as marriage, divorce, retirement or real estate transactions. It also reduced the pay-out delay from three months to 20 days and dropped the 10% co-insurance part which had prevailed in many European countries. In the scheme, the pay-out is totally automatic, the depositors don't have to apply for it. As the crisis worsened, the EU decided to establish the banking union and it also enforced further harmonization of the national deposit insurance schemes (European Parliament, 2014a). The targeted financial endowment is 0.8% of the total covered deposits. This fund should be ex-ante established by 2024 (Art. 10 para. 2, Directive 2014/49/EU) and can include cash, deposits, payment commitments and low-risk assets which can be liquidated within a short period of time. The contribution to the deposit insurance scheme is now not only based on the amount of covered deposits but also on the risk profile of the banks. The risk-adjusted calculation formula is defined by the European Banking Authority. The Directive 2014/49/EU also made it possible for national deposit insurance funds to lend between each other, however so far no voluntary lending has been agreed (European Commission, 2016). Furthermore, it reduced the pay-out to 7 days and required to disclose clear information about the deposit protection system. Depositors at bank branches in another member states are paid-out by the deposit insurance fund in the host member state (European Parliament, 2014a). Currently not only the banks in their host member state are required to join to the deposit

insurance scheme but also third country branches are covered. According to the empirical studies, the above modifications increased the effectiveness of the deposit insurance schemes in case of crises however also induced more serious moral hazard.

In 2015, the Commission (EC) proposed an European Deposit Insurance Scheme (European Commission, 2015). In this proposal, a full common deposit insurance scheme would be stepwise installed by 2024. First, a re-insurance phase, then co-insurance and full-insurance with a funding equal to 0.8% of the total covered deposits (around €43 billion in the eurozone) as Figure 3 shows. This proposal was not yet approved by the Council of EU and the European Parliament. Later, I will introduce this recommendation of the EC in greater detail.

5.2 Eurozone in the crisis

In the following part, I examine how the national systems of deposit insurance worked during the eurozone (EZ) crisis. First, I briefly describe the functioning of the euro area at the time of the crisis. Second, I analyse the reasons and effects of the crisis on the financial sector.

The eurozone is a monetary union without any deeper fiscal integration. The Economic and Monetary Union (EMU) was established to support growth, high employment and further integration of the member states (European Commission, 2007). It was launched in 1992 and gradually implemented in the decade. It involves a common currency, a common monetary policy, and minimal coordination of fiscal policies by the Stability and Growth Pact (SGP). The SGP's aim is to prevent the emergence of excessive public deficit and debt. Nevertheless, as the last crisis showed, it doesn't fulfil its object to ensure debt sustainability. When the crisis hit the EU, many of the member states had large amount of public debt in addition to having heavily indebted private sector. Moreover, not this was the only problematic point in the institution of the monetary union that facilitated fragilities. At the time of the crisis, there was no common supervision and resolution, and without these a credible no-bail out clause is unimaginable (Baldwin & Giavazzi, 2015). If insolvent member states don't get credit, then their banking sector would become insolvent too which would cause serious harms in the whole European banking sector because of the significant cross-border activities. As shown by Allen and Gale (2000), failure of banks can easily affect other healthy banks too. The incompleteness of the monetary union resulted that (1) there was a vicious circle between the banks

and sovereigns and (2) due to the common currency devaluation was not an option. These characteristics made the crisis much more severe.

As identified by Baldwin and Giavazzi (2015), the main reasons of the eurozone crisis were the economic imbalances between core and periphery states, and the lack of policy reforms. There were substantial capital flows (current account surpluses) from the core nations like Germany, France and the Netherlands to periphery countries like Greece, Ireland, Italy, Portugal and Spain (current account deficits). This large amount of capital then financed private and government spending which increased not only the wages (and decreased the competitiveness) but also the government and private debts. Moreover, the fact that this capital went into non-traded sectors (such as real estate) meant that it will be hard to repay it in the future.

There are several reasons behind these capital inflows. There are abundant investment possibilities in the least developed EU countries compared to the core nations. Furthermore, cheap credit is available. Globally, even before the financial crisis, the borrowing costs plummeted consistently (Baldwin & Giavazzi, 2015). There are several hypothesis for the fall in the borrowing costs, however it is disputed between economists that which explanation until which degree is responsible for the phenomenon (Fidora & Bracke, 2008). According to Nicolas Véron (2013), with the creation of the EMU, Europe's capital market became more integrated and this raised the expectation of a future consolidation wave. The banks, to be able to remain on the top, started to increase their size by leveraging and acquiring their rivals. Véron highlights that the acquisition and leveraging was viewed positively by authorities as the local "national champions" will be able to compete more effectively on the integrated market. Moreover, thanks to the common currency, there was zero currency risk in the euro area. At the time of the crisis, the trust in the euro area was high as shown by the trend that all of the EZ nations borrowing rates plummeted and converged to each other (Baldwin & Giavazzi, 2015). Unfortunately, until the crisis, these capital flows were viewed as a real economic convergence between member states and not as dangerous imbalances.

The crisis started with a sudden stop of capital flows after it, originated outside from the EU, reached the euro area. The stop of flows raised concerns about the solvency of banks and sovereign debts in the periphery. It was especially cumbersome when in October 2009 the Greek government announced that the previous governments had hidden the real figures of government debt and the true size of the

budget deficit is twice as large as previously thought (Baldwin & Giavazzi, 2015). In addition, during the pre-crisis years, not Greece was the only country which violated the pact. Between 1999 and 2007, there were 34 breaches of the 3% threshold for the government deficit even by Germany and France, which set especially damaging precedents. The SGP sanctioning mechanisms were barely employed before the crisis (Baldwin & Giavazzi, 2015).

In the crisis, the governments' tax base decreased and they had to assume private debts (mostly as they saved their too big to fail banks) which further increased the public debt. This created a public debt crisis, and the governments' borrowing cost rose rapidly. The rise of capital inflows was not unique to the eurozone. Same happened in the U.S., Japan and many emerging countries too (Baldwin & Giavazzi, 2015). Borrowing cost decreased significantly even before the crisis broke out. The characteristics which made the crisis worse are the specific amplifiers in the system of eurozone such as the vicious circle between banks and sovereign, no lender of last resort (LOLR) for governments and the predominance of bank financing.

First, there was no real lender of last resort for governments. This meant that self-fulfilling panics could cause sovereigns to become insolvent. The European Central Bank (ECB) was later equipped with the Outright Monetary Transaction (OMT) instrument which partially act as a lender of last resort (Wyplosz, 2012). Moreover, Europe's special trait is the predominance of bank financing of the economy. At the time of the crisis banks were under capitalised and had several times larger balance sheet than their home country's GDP (Baldwin & Giavazzi, 2015).

The case of Ireland is especially informative since it went into the crisis with low level of government debt (43% debt-GDP ratio in 2008), however with outstanding size of banking sector (783% bank assets-GDP ratio in 2008 (Baldwin & Giavazzi, 2015)). As the capital flows stopped, the asset prices plummeted, banks' capital eroded, they got into trouble, and the government almost become insolvent as it saved its banks. The Irish government was bailed out in the end of 2010 by the IMF, eurozone governments and ECB (Baldwin & Giavazzi, 2015).

The Irish example clearly shows that the national instruments (supervision, resolution and deposit insurance scheme) were not capable to cope with the banking crisis. The bad equilibria described by Diamond and Dybvig (1983) cannot be avoided. The banking sector was too big in many countries thus its sovereign hardly could save it without to become also insolvent. There was no euro area level structure (such as the banking union today) which could handle a large financial crisis.

Subsequently, as the Belgian government at end of 2011 saved its national bank, Dexia, the bond holders started to demand higher interest rates in their fear that the Belgian government will also need to be bailed out (Baldwin & Giavazzi, 2015). Cyprus is also needed to be bailed out due to its banking sector's large exposure to Greek government bonds in 2013. The Cypriot government even decided to impose capital controls to foster financial stability. These measures were eventually lifted after two years (Baldwin & Giavazzi, 2015). The exact effects of them are hard to assess since they were implemented simultaneously with other instruments. In any case, the controls were quite controversial in the European Union since the free movement of capital is one of the fundamental principle of it. Within the euro area, if the ability to transfer money is restricted, then the value of euro in that particular country will becomes inferior to the value of euro in other countries (Wolff, 2013). Nevertheless, the use of capital controls is quite rare since they may may send the adverse signal that the first-best policies, such as deposit insurance, are not reliable to stop the bank runs (Ostry et al., 2012). Historically, capital controls were usually implemented as long-term measures to manipulate trade. However, they were re-assessed recently as macro-prudential instruments by several scholars. For example, Ostry et al. (2012) argues for the flexible use of capital controls to maintain financial stability in crisis.

The clear message of the euro area crisis was that the national instruments were not able to manage their problematic large banks, and that EZ needs supra-national level instruments.

5.3 Sovereign-bank loop

There was and in some degree still there is a significant vicious circle between the sovereigns in the euro area and the banking industry of these countries. This vicious circle has contributed a lot to the severity of the recent crisis. The relationship between them is the following: banks hold large amounts of government bonds compared to the size of their balance sheet (e.g. in case of Italy, the banks' average exposure to home sovereign was 10% of total bank assets 2015) (Magnus & Ciucci, 2016). Thus, when the sovereigns are likely to fail and the value of the government bonds are decreasing, it will also deteriorate the banks' balance sheet, which will increase the likelihood that the banks will fail. Furthermore, the banks exposed to the domestic economy and also benefit from the government guarantees. On the other hand, the sizes of the banks are several times larger than the size of their

home countries' GDP (e.g. in case of Italy the total bank assets as a percentage of GDP was 220% in 2007 (Baldwin & Giavazzi, 2015)), so when the banks are going to bankruptcy, the sovereigns will also get in to trouble due to related costs of the resolution. The states' financial costs from a banking crisis result from recapitalisation, liability guarantees, decreased tax revenues and additional expenditures to mitigate the adverse effects of the crisis (Pisani-Ferry & Wolff, 2012). The sovereign and bank CDS spreads strongly correlates in the euro area which may also refer to this vicious circle (see Figure 1). As shown by De Grauwe and Ji (2012), bond markets in a monetary union, such as eurozone, are more susceptible to self-fulfilling liquidity crises than in countries with own currency. In stand-alone sovereigns, the national banks can devaluate and easily act as a lender of last resort. On the other hand, in a monetary union without LOLR, the panic of investors triggers a bad equilibria.The aim of the banking union is to break the sovereign-bank loop.

Decoupling banks from sovereign would result that the funding costs of the banks will be more equal across the EU, and the banking market would become more integrated.

5.4 Banking union

As the financial crisis unfolded into a euro area debt crisis, the leaders of the European Union decided to establish the banking union to break the sovereign-bank loop. The banking union is based on the Single Rulebook which is a set of harmonized rules regulating the financial sector initiated by the European Commission (EC) and the European Banking Authority (EBA). Geographically, all the euro area countries are members of the banking union and the non-euro area EU countries are free to join to it. Originally, the banking union is planned to have three pillars: the Single Supervisory Mechanism (SSM), the Single Resolution Mechanism (SRM) and European Deposit Insurance Scheme from which the first two were already adopted.

The Single Supervisory Mechanism means that the European Central Bank is the main supervisor of the financial institutions in the euro area. Under this mechanism, it has extensive powers: grants and withdraws licences, authorises mergers and acquisitions, and determine prudential requirements (Schoenmaker, 2015).

It directly supervises the most significant banks in the euro area (126 banks as of December 2016) (European Central Bank, 2016). In this context, significance is based on number of criteria such as the total assets as percentage of the home

country's GDP, cross-border activity or size of total assets over €30 billion. Common supervision is more optimal for the euro area since it considers the whole zone and not only the given country where the supervised bank resides. The above conditions ensure that the so called "national champions" will be supervised by ECB, and they won't get special handling from their home country's authority. Deniz Anginer, Asli Demirgüç-Kunt and Min Zhu (2014) pointed out that supervision is an effective way to limit the adverse moral hazard effects of deposit insurance.

Despite the strengthened ex-ante supervision, banks may fall. The Single Resolution Mechanism is an independent European Union Agency and responsible for restructuring of the troubled banks in a way that a failure won't harm substantially the economy or cause any financial instability. The main methods of resolutions can be a takeover by a healthy bank, a public assistance programme, and a liquidation with pay-outs to depositors by the deposit insurance fund (Schoenmaker, 2015). One of the main aims of the SRM is to reduce to burden on the taxpayers regarding to resolution. To ensure this, the resolution mechanism has its own fund, the Single Resolution Fund (SRF), which equals to 1% of the covered deposits, and apply bail-in during the resolutions (European Parliament, 2014c).

Before using any resources from the SRF, the SRM checks whether there is any private sector solution or the bail-in will be sufficient to resolve the case. Bail-in means that the shareholders and bond holders of the failing bank will be bailed-in up to 8% of the total liabilities. The bail-in rules are set in the Banking Recovery and Resolution Directive (BRRD) (European Parliament, 2014b). This directive creates a more certain legal framework for resolution.

The Single Resolution Fund is only accessible after the bond and shareholders are bailed-in. This fund is ex-ante financed by the banking sector on risk-based contribution. The target level of the fund is at least 1% of covered deposits of banks in the banking union (estimated to be €50 - €55 billion) which will be reached until 2024 (European Parliament, 2014c). To establish a credible resolution mechanism, the EU needs a financial back-stop. The European Stability Mechanism (ESM) could provide this safety by giving credit to the SRF. (European Parliament, 2014c) The ESM has a fund up to €500 billion. The presence of this back-stop is important in case of a systematic crisis since the size of the SRF won't be sufficient to resolve all the troubled banks.

The SRM effectively reduces the burden on the sovereigns since it is responsible for the resolution of the failing banks thus it lessens the link between banks

and sovereigns.

The third pillar of the banking union is the common European deposit insurance scheme however this wasn't implemented yet, and only a commission proposal exists (European Commission, 2015). I will discuss this proposal later. In the current system, still the national deposit insurance funds are responsible for the protection and pay-out of the depositors.

A separate tool to break the loop is ESM's direct recapitalization instrument (European Council, 2013). It is a financial assistance tool with which ESM can recapitalise euro area banks directly, by purchasing equity in the bank. Nevertheless, the necessary conditions to allow ESM to purchase equity stake is rigorous. ESM can use its fund only when the bail-in of private investors and the contribution of the Single Resolution Fund are not sufficient, and the state is unable to provide financial assistance (European Council, 2013). Due to these strict conditions, the direct recapitalization instrument hardly weakens the link between banks and sovereigns. Before this instrument was in place, Spain's government directly borrowed from the ESM in 2012 to recapitalize its banks which together with further costs of the crisis management in turn increased its government debt from a low level (36 percent of GDP in 2007) to well above the Maastricht limit (Baldwin & Giavazzi, 2015).

Dirk Schoenmaker (2015) highlights that the long term objective of the banking union is to deal with cross-border banking to avoid coordination failure resulting from the national authorities' home bias. Without handling it, contagion can occur more easily and have serious consequences on banking system stability (Allen & Gale, 2000). Table 2 shows that top 25 banks in the euro area have 24 percent of their assets in other EU countries (Schoenmaker, 2015). Now, in the framework of banking union, larger shares of the balance sheets of the banks are considered during the supervision and resolution decisions. In the European single market, capital is one of the four freedoms. In reality, the free movement of capital is started in 1992 with the Maastricht Treaty. (Baldwin & Giavazzi, 2015) This treaty contained the necessary legalisation to abolish the capital controls.

6 Objectives of a common deposit insurance

The motive of the banking union is to effectively break the sovereign-bank loop. The first two pillars, the Single Rulebook, and the BRRD are already implemented thus the question is whether to what extent the common deposit insurance is still necessary to fulfil the objective of the banking union.

The first argument for a common deposit insurance is the lack of credibility of the national deposit insurance schemes in several, mostly smaller countries due the small size of their funds and not large enough fiscal back-stops relative to the size of their banking sector. Free mobility of capital has raised the possibility of the emergence of large banks and banking sector even in small countries. Without credibility, deposit insurance cannot prevent bank runs since the early agents will withdraw and cause bank panics (Diamond & Dybvig, 1983). Furthermore, any divergences between national deposit insurance schemes can enhance the financial sector's fragmentation across member states. In Cyprus, Luxembourg, Malta and Portugal the amount of covered deposits by the deposit insurance fund is well above 50% of the countries' GDP (see Figure 4) (Cannas et al., 2015). This large amount of covered deposits undermines the credibility of the national deposits insurances in case of huge idiosyncratic shocks. Per the Directive 2014/49/EU, the required ex-ante size of the national deposits insurance funds is 0.8% of the covered deposits in the member states. A fund like this hardly can protect even against large bank's bankruptcy. Nevertheless, it is worth noting that the credibility also depends on the health of the financial and of the public sector. Unfortunately, after the bankruptcy of a bank, the other banks in the country must replenish the deposit insurance fund thereby further deteriorating their profitability. A European deposit insurance fund with a financial back-stop (such as ESM) could provide a credible crisis management solution in case of large shocks since insurances works better as the number of the banks and states involved are larger. A more credible scheme would be in the interest of all the depositors (increased safety of deposits), banks (more stable safety net, cheaper credit), member states (increased protection of public finances and persistence in crisis) and the European Union (increased persistence in crisis).

Another main advantage of a common deposit insurance scheme would be to establish a consistent and incentive compatible deposit insurance mechanism (Schoenmaker, 2015). Currently the deposit insurance schemes are on national while supervision is on European level thus supervision decisions (and lack of decisions) would make national taxpayers pay even though their government might

oppose a decision or blame the supervision for inaction. For example a bank failure and its consequnces are worn by a national insurnace fund because the European supervision authority decided not to act in time. This may result in ineffective governance and cause conflicts which would be hard to resolve since there is no mechanism to settle disputes between agencies not operating on the same level. Consistency would ensure that there is no coordination failure and that the supervisor (SSM) is confronted with the costs of its action (Schoenmaker, 2015). This incentive compatibility follows from the principal-agent theory (Jensen & Meckling, 1976). Moreover, supranational management ensures more efficient operation and governance and swifter decision making to better cope with crises. A supranational common insurance would also take into account cross-border externalities of bank crises by avoiding co-ordination failures. Consistency and more efficient governance would be in favor of all the affected agents. However, member states might resist further EU integration because of their fear of the additional reduction of their national mandate.

At last, risk-sharing is needed to break the sovereign-banks loop to ensure that in asymmetric shocks not only the affected member states have to bear the costs. The risk-sharing would also grant further credibility to a common scheme. In addition, if risks are shared, significant part of the present fragmentation among banks within the banking union would disappear. Furthermore, the risk pooling could help to establish a more credible no bail-out clause of both banks and member states since if a sovereign become insolvent, the banking sector could still be viable or if a member state's banking sector struggles, the public finances aren't as much endangered. However, as Freixas and Rochet (2008) showed, risk-sharing cause moral hazard. That's why some prerequisites need to be implemented to limit the negative consequences.

To conclude, the above discussed three objectives justify a common deposit insurance scheme.

(*i*) **Credibility** and adequate size of the deposit insurance fund and fiscal back-stop

(*ii*) **Consistency** between supervision and deposit insurance scheme

(*iii*) **Risk-sharing** of the burden in case of failure

In the later parts, I will analyze the policy options according to these three objectives.

It is worth noting that the Single Supervision Mechanism and the bail-in rules only makes it less likely but won't exclude that the depositors will be affected by a bank failure in the future. A common deposit insurance is needed to increase the trust in the European banking system.

7 Prerequisites of a common deposit insurance

As national deposit insurance schemes induce moral hazard, the insurance of national deposit insurances similarly can have adverse effects. In this case, the common deposit insurance might change the member states behaviour in an undesirable way to apply riskier measures. The Single Rulebook, BRRD (especially the bail-in rules), amendments to capital requirements regulation and directive, SRM, and SSM have already significantly reduced risk, moral hazard and the monitoring costs of banks. The risk-based contribution of the banks to the deposit funds (Merton, 1977) and the EUR 100,000 coverage limit have also significantly restricted the moral hazard. The reduction of moral hazard was mainly achieved by decreasing the banks incentives to take higher risk and limiting the available measures for the member states to incentives their banks to take higher risk. Furthermore, the macroeconomic surveillance of the member states was strengthened by the Treaty of Stability and Coordination and the Euro Plus Pact (Nieminen et al., 2016). Note that the bail-in tool induces risk avoidance not only for the banks but also for the member state as losses in case of a bank failure would affect mainly domestic shareholders.

However, before further risk-sharing, some prerequisites should be implemented to avoid moral hazard in a sufficient extent. Member states may incentivize their banks to assume more risk by adopting different national legalisation as the costs of failure would be borne by all the banking union countries. Furthermore, the legacy problems related to the recent crisis such as the high share of non-performing loans should not be covered by a common scheme. The responsibility for the losses arising from them should remain at the member states, but might be resolved with the assistance of European authorities. Currently, political willingness for risk-sharing is low. It meets resistance especially from the core European nations (Schoenmaker & Wolff, 2015). That's why the following problems should be addressed.

(i) **Sovereign exposure of banks.** Significant share of the banks' balance sheet is government bonds where they reside (Magnus & Ciucci, 2016). The share has largely increased since the start of the crisis. The fundamental reasons behind it might be that the national authorities incentivized banks to help their governments to finance itself and the ECB's Long-term Refinancing Operation (LTRO) has provided low interest rate funding to euro area banks with sovereign debt as a collateral (Véron, 2015). As the CDS of the sovereigns are different, it follows that also the banks' risk profiles are dif-

ferent, nevertheless government bonds currently carry zero risk-weight in the bank's balance sheet. This zero-weight assessment might change in the future (Véron, 2015). A sovereign exposure rule or a common upper limit on the proportion of government bonds should be introduced to handle this difference (Wolff, 2016). However, a measure to regulate the government bond holdings cannot be introduced in a short period since the banks are important lenders of the governments and local councils. The banks basically act as a shock absorbers for sovereigns. A rapid reduction of the vast amount of sovereign debt could induce a public debt crisis. Another option would be the introduction of Eurobonds to decrease the risks of sovereign bonds (Wolff, 2016). The decline in the real interest rates indicates a growing need for safe assets. The availability of such assets has decreased over the last decade mostly by the reassessment of US residential mortgages and European periphery sovereign debt (Caballero & Farhi, 2014). The scarcity of these safe assets can cause sluggish recovery and capital flights in financial stress. They are important for the smooth functioning of financial markets (Brunnermeier et al., 2016). Brunnermeier et al. (2016) proposed an euro area-wide safe asset without joint liability among sovereigns to fulfil this need. In their proposal, senior tranches of sovereign bonds would be included in the safe assets. A central institution would purchase these bonds and issue European Safe Bonds and European Junior Bonds. With adequate subordination level between these bonds, the safe assets (European Safe Bonds) can be as safe as German sovereign bonds without the society bearing any further losses compared to the current status quo (Brunnermeier et al., 2016).

(*ii*) **Healthiness of banks' balance sheet.** The European banks have varying amount of non-performing loans (NPLs) in their balance sheet which hurts not only their profitability but also means sytematic threats. This is the legacy of the recent global cirsis. There was no real clean-up of these bad loans after it. Moreover, the banks are not well-capitalized at the same degree in all the member states. Some of the member states has more problematic banks than others which again prevent further risk-sharing. The solution for the NPLs problem is rather complex since first it should be agreed who should bear the losses, the banks, borrowers or the public. However, most of the losses should remain at the member states and not distributed across the European Union. Several proposal were made such as to create a bad bank or clearing houses at European level to transfer the problematic loans and to overcome on market

failures (Demertzis & Wolff, 2016). Nevertheless, banks could be incentivised also through regulation to resolve the impaired assets more quickly (Véron, 2015).

(*iii*) **Different national macro-prudential policies.** The treatment of the foreign currency loans or the loan-to-value ratios on mortgages are different across the eurozone countries. (Wolff, 2016) These differences influence the riskiness of the banks. Through these macro-prudential policies, the national government can handle their "national champions" differently. The nations have the incentives to do so since under the EU's single capital market the banks compete in an integrated market, and the governments want to defend and assist them. The different policies not only influence the riskiness of the banks but also distort the market. Moreover, the governments' ownerships in the banks should be reviewed since it could create excursive motives in the management of banks. The empirical literature states that prudential policies are efficient in limiting the side effects of deposit insurance related moral hazard (Anginer et al., 2014).

The limitation of the sovereign exposure of banks and the restoration of the healthiness of banks' balance sheet would deal with the legacy problems while the unification of the marco-prudential policies would restrict the member states ability to direct their banking sector to take higher risks.

Furthermore, any policy option with significant national part would also limit the consequences of moral hazard by decreasing the incentives of member states, however, would also limit the extent of risk-sharing at the same time. This kind of approach would be the same as the incomplete coverage discussed by Shavell (1979).

Until at least some of the above measures are implemented, a common deposit insurance would largely cover present sovereign problems and can induce moral hazard thus the introduction of it is unlikely. Domestic political risk brought forth by crisis can further exaggerate the moral hazard problem. The above discussed measures would not only facilitate the introduction of a common deposit insurance but also foster a more integrated banking market by balancing the wide spread in the funding costs of the banks across Europe (Schoenmaker & Wolff, 2015). Nevertheless, any shift of legitimacy and accountability from national to supranational level, even if all the measuers are implemented, requires political trust from the side of member states.

8 Policy options

In the following part, I list the most relevant policy options. I shortly describe and analyse them, and later, in the Comparison of policy options part, I compare them according to the defined three objectives. I consider the following policy options in the analysis: national deposit insurance schemes (baseline scenario), credit line to national deposit insurance schemes, re-insurance, co-insurance and full insurance. A major difference between these policy options is that to what extent they mutualise risk and cause moral hazard. It is essential to note that there is a trade-off between risk-sharing and moral hazard. Increased risk-sharing generates higher incentives for member states to act in an undesirable way. In the baseline scenario, there is no further risk-sharing, while full insurance would ensure complete risk-sharing. The differences in the share of the remaining national part in the deposit insurance scheme is an important factor since it determines the eventual effectiveness in breaking the vicious banks-soveregin circle (Schoenmaker & Wolff, 2015). High share of national part would conserve differences between the countries' banking system.

In the analysis, I will discuss the scenarios according to the three objectives. (1) Size of the deposit insurance funds and of the fiscal back-stop to have a credible insurance in case of large systematic shocks. (2) Consistency between supervision and deposit insurance scheme to avoid the conflicts due to different supranational and national functions. (3) Risk-sharing of the burden in case of bank failures to break the vicious sovereign-banks loop.

Nevertheless, without at least partial fulfilment of the prerequisites, further risk-sharing is unimaginable since they would create adverse incentives for both banks and member states. (1) The sovereign exposure of banks should be reduced. (2) The problem of NPLs is quite extensive in the southern region of Europe. (3) Financial macro-prudential policies should be managed at supranational level. Until the above issues prevail, the riskiness of the banks will be different across countries in the European Union.

It is important to note that whichever of the below options will be implemented it should be compulsory for the EZ members to avoid adverse selection (Gros, 2013). Otherwise only countries with riskier bank profiles would join to the common deposit insurance scheme.

8.1 Baseline scenario (no policy change)

The baseline scenario is that the national deposit insurance schemes would remain in place. Currently, there is only minimal harmonization between the national insurance schemes. The regulation requires a fund size of 0.8% of covered deposits nationally. This option isn't desirable since it wouldn't insure credibly in case of large systematic failures because the size of funds and the governments as back-stop wouldn't be adequate. Moreover, a large crisis could evoke a sovereign debt crisis further aggravating it. Differences in the supranational supervision and national deposit insurance would still be present.

In large systemic crises, the government can borrow from ESM if it doesn't have sufficient funds for crisis management. However it would deepen the crisis by increasing the sovereign debt level. In a hypothetical case, a government would further lend the borrowed amount to the national deposit insurance fund or recapitalize its banking sector.

8.2 Credit line to national deposit insurance schemes

The European Stability Mechanism could be able to lend (after approval of the representatives) to national deposit insurance funds (Schoenmaker & Wolff, 2015). The ESM would provide liquidity to national deposit insurance schemes. A direct link between ESM and the national funds could further strengthen the credibility of this option, however it requires the ESM treaty change (Véron, 2015). An alternative option is to build up a mandatory lending scheme between national deposit insurance funds. These options would reduce to a small extent the sovereign-banks loop by relieving the burden on the government in case of systematic financial crisis, however the burden would be significant on the banking sector by increased premiums. It could also minimally increase the credibility of the deposit insurance by serving as a stable fiscal back-stop. However, the consistency issues are not solved.

These options (either to link ESM without the ESM treaty change or the mandatory lending scheme) is currently feasible since it doesn't result in real risk-sharing, only would mean a lending option to the national deposit insurance funds.

8.3 Re-insurance

Foremost, the re-insurance, suggested by Gros (2013), would make a substantial difference compared to the baseline scenario by sharing risks between member states. In the re-insurance scheme, there would be a common supranational deposit insurance fund which is only used when the national fund is exhausted. Thus, the common fund is used only in large, systematic crisis, when the losses exceed the size of the national insurance fund in a ex-ante determined 1-2 year timeframe. The aim of re-insurance scheme is to stabilize and ensure confidence in the financial system. Losses, in case of small and medium bank failures, would be completely covered by the national part. Common funds should be used only when large, cross-border banks or many smaller banks failed. The common fund would be financed by the whole European banking sector by risk-based contribution at national level and built up in a medium term (2-5 years period) (Gros & Schoenmaker, 2014). The ESM could serve as a back-stop for the common deposit insurance fund.

The re-insurance would increase the credibility of the deposit insurance substantially in case of large, systematic shocks due to its greater size and shared risks. This scenario would also be consistent with the supranational supervision of the large, cross-border banks since losses emerged from the failure of these banking groups would be covered by a common fund. Nevertheless, this scheme's governance efficiency is questionable and it carries some operational risk because of the duplication of funds and complexitiy of the scheme (Schoenmaker, 2015). The sovereign-banks loop would be also reduced, however not fully severed, by the partial risk-sharing. Nevertheless, the risk-profile of the banks wouldn't be equal across member states since banks would still face higher premiums whenever small and medium banks failed.

The national part and the risk-based contribution at national level would ensure an incentive compatible system and limit moral hazard (Gros, 2013). Moreover, the total amount of contribution can be capped and national funds can only receive assistance when they have reached the required unified fund size. However, at least partial fulfilment of the prerequisites is advisable since without them the governments wouldn't be incentivized to make systematic reforms in the financial sector such as reduction of NPLs or sovereign debt holdings. In a re-insurance scheme, different caps can be determined to limit the maximum contribution of the common fund and to decide how much resources should be allocated to the national and to the supranational fund. These caps could serve as further incentives for the govern-

ments to pursue reforms. The combined size of the two layer fund system would be similary to the current regulation 0.8% of the covered deposits.

8.4 Co-insurance

The co-insurance is a further step in risk-sharing. Compared to the re-insurance, it shares the losses from the beginning in a pre-determined percentage. If this percentage is 40%, then 60% of the losses is covered by the national part until a given threshold, the remaining is paid by the common supranational fund. As the national fund is depleted, the further losses are covered by the common fund. However, similarly to the re-insurance, the amount of maximum contribution can be also capped. These parameters greatly affect the risk-sharing. Similary, the combined size of the national and supranational funds would be 0.8% of the covered deposits. The allocation between the funds is important since ultimately this shows the level of risk-sharing. The common fund is financed by all of the banks in the euro area according to risk-based contribution relatively to all the other banks. Plainly, the back-stop is the ESM.

This joint assumption of risk would further reduce the link between the sovereign and banks, and would reduce the differences and funding costs between the member states' banking sectors. The credibility of the deposit insurance across Europe would further increase. It would be also consistent, however it similarly carries some operational risk because of its complexitiy.

Nevertheless, the fulfilment of prerequisites are necessary for this step to reduce the risk induced by moral hazard. A small national component (hardly an incomplete coverage) would not ensure incentive compatible operation (Shavell, 1979).

This scenario can be an optimal transitional scheme, since it would ensure the option to set progressively the percentages to finally become full insurance.

8.5 Full insurance

Full insurance would ensure complete risk-sharing in the euro area. It would function without any national fund thus redistributes risk across all the banks in the banking union according to their risk profile. There would be only a common deposit insurance fund equal to 0.8% of the covered deposits in the banking union. Every

bank failure would be covered by a common fund. Again, the ESM could serve as the back-stop. In this scenario, banks directly pay a risk-based premium relative to all other banks in the eurozone into an European deposit insurance fund. All the three objectives would be entirely achieved. The full insurance can provide the most effective protection in case of asymmetric schoks. Nevertheless, without the fulfilment of prerequisites, this option would create substantial moral hazard by giving the opportunity to member states to incentivez their banking sector to excessive risk-taking since any loss would be covered by a common fund. This options would be the most ideal for the European Union, however the prerequisites are necessary for successful and incentive compatible operation.

8.6 Deposit Insurance Fund and Fiscal Back-stop

As systematic banking crises endanger all the European countries and involve huge fiscal costs, arrangements for a common deposit insurance fund and fiscal back-stop should be made. A robust and incentive compatible institutional set up is needed for credibility of these arrangements to ensure depositors confidence.

In case of deposit insurance in Europe, the target level for ex-ante national deposit insurance funds is 0.8% of the covered deposits per member states. This could be the target level for a cost netural common fund which size then will be around €43 billion[2] in the eurozone. The resources from the national funds should be transferred to the European fund to set up it without additional charges affecting the financial sector. Gros and Schoenmaker (2014) analysed the capability of such fund size. They argue that a common deposit insurance fund together with the Single Resolution Fund would be able to cope with the failure even one of the largest European banks or with the failure of several major banks at once. When this fund is exhausted, banks should pay extraordinary ex-post contributions up to a certain level, which does not endanger the financial situation of the healthy banks (European Commission, 2015). The fund's financial means can include cash, deposits, low-risk assets and partially payment commitments[3], which can be liquidated within a short

[2]The Joint Research Centre of the EC estimated the amount of deposits in the eurozone in 2011. The total amount is close to €11,000 billion from which the covered deposits are around €4,150 billion (Cannas et al., 2015)

[3]Payment commitments are fully collateralised liabilities from banks toward the deposit insurance fund. The collateral can be low risk assets without encumbered by third party. According to the current regulation the share of payment commitments cannot exceed 30% of the total amount of funds. (European Commission, 2010)

time (European Commission, 2010).

To ensure an incentive compatible scheme, the contributions from banks must be based on their risk level and the amount of covered deposits under their control. The specification and calculation of the risk-adjusted fees are determined by the European Banking Authority.

In a major financial crisis, a supranational back-stop is still necessary to ensure the safety of the deposits since sovereigns might not serve as a reliable back up. The back-stop should be based on ex-ante rules to be credible. Pisani-Ferry and Wolff (2012) discusses three options for a common fiscal back-stop: an ex-ante burden-sharing agreement, the European Stability Mechanism and a contingent European taxation.

(*i*) **European Stability Mechanism** The ESM is an international financial institution set up by euro area member states to assist them in severe financial crises. It has €80 billion paid-in capital from member states and a lending capacity of €500 billion raised by its own bond issuance (European Council, 2013). The main advantage of the ESM is that it is already in operation, has a strong governance mechanism, and is capable to handle major crises too. However, it has its own shortcomings. It would not be enough in exceptionally large crisis affecting all euro area countries. Furthermore, per the current regulation it cannot provide ex-ante guarantees which decreases its credibility as a fiscal back-stop (European Council, 2013). The ESM treaty has to be changes in order to the ESM to be able to automatically provide assistance to the common deposit insurance scheme (Gros & Schoenmaker, 2014). The maximum amount of contribution by ESM also can be capped to limit the extensive risk-taking generated by moral hazard (Nieminen et al., 2016).

(*ii*) **Ex-ante burden-sharing agreement** Ex-ante agreement on burden-sharing based on clear rules and governance structure could serve as a credible back-stop. The rules should determine that in banking crisis how much of the loss should be borne by European taxpayers and taxpayers in the member state where the crisis occurred. Nevertheless, any agreement without pre-funding can lose its credibility in severe distress as member states might withhold their agreed part of the contribution (Pisani-Ferry & Wolff, 2012).

(*iii*) **Contingent European taxation** A contingent taxation proposed by Pisani-Ferry and Wolff (2012) could be also a credible back-stop option. This

would have enough capacity to cover the costs of a major banking crisis. Even a similar, but larger framework as the ESM can be built on it to issue debt on favourable terms when it is necessary. Furthermore, this system would be incentive compatible if all the member states have to contribute with supranational taxes to crisis resolution. Although, a contingent taxation might have adverse consequences on economic activity. It could further deepen the crisis by decreasing economic activity. Overall, this contingent taxation option is an unlikely solution since the eurozone is not enough integrated politically.

In the short-term, the ESM could be the only viable back-stop for the common deposit insurance fund since the two other options would require significant deepening of the euro area in terms of governance and democratic legitimacy (Pisani-Ferry & Wolff, 2012).

8.7 Proposal of the European Deposit Insurance Scheme by the European Commission

As the banking union is still incomplete and the depositors are still vulnerable to large shocks, the European Commission has adopted a legislative proposal for a European Deposit Insurance Scheme (EDIS) on 24 November 2015 (European Commission, 2015). The key principles of the proposal are to further reduce the link between banks and their sovereigns, prevent bank runs and increase financial stability without further increasing the burden on the banks. The EDIS would achieve its objectives by pooling the available resources.

The European Deposit Insurance Fund would be established first to complement the national deposit guarantee funds. It would be gradually built up on the current Deposit Guarantee Scheme Directive (2014/49/EU) to provide full protection and risk-sharing. During the 8 year transactional period (see Figure 3), the first stage is the re-insurance, then co-insurance and finally the full insurance. After the last stage, the national deposit insurance schemes would stay in place to administer the pay-outs according to the common regulations. The aim of the gradual implementation is to ensure continuity and to reduce the moral hazard by making sure that in the re-insurance phase the national funds are depleted first and in the co-insurance the risk are shared only partially from the first loss.

The European Deposit Insurance Fund similarly to the existing national funds would be based on risk-based contribution from banks and have a fund size equal to

0.8% of the covered deposits in the banking union. It would be cost-neutral since the banks will contribute to the EDIS than to the national deposit guarantee schemes. However, when this common fund is depleted, the national deposit insurance schemes and ultimately the national governments resposibility to serve as a fiscal back-stop (European Commission, 2015).

According to the proposal, the central governing body of the EDIS would be the Single Resolution Board (SRB), which is already established in the frame of the Single Resolution Mechanism. The Single Resolution Board's task is to monitor, manage potential conflict of interest and make swift decision to prevent any contagion and financial instability. The SRB would manage the SRF and the EDIS together to create synergies.

The EDIS would be based on the Single Rulebook, keep the current level of protection (EUR 100,000), mandatory for all Euro area members and open also to non-Euro area Member States (Stuchlik, 2016). In order to establish the EDIS, the Commission has proposed to amend the Single Resolution Mechanism Regulation No 806/2014 (European Commission, 2015).

The proposal presented by the Commission haven't been adopted by the European Parliament yet. It was put on hold due to the opposition of Germany and many Northern European member state because their fear of the adverse effects of moral hazard (Wolff, 2016). During the discussion of EDIS, in the European Council and the Parliament, several, mostly technical concerns were mentioned regarding to scope, stages and governance of EDIS (Lange, 2017).

8.7.1 Three evolving steps of the European Deposit Insurance Scheme

Per the proposal, the implementation of EDIS would have started in middle of 2017. The three major phases of EDIS are re-insurance, which would last until 2020, co-insurance until 2024 and then full insurance onward.

The re-insurance phase would provide assistance to the member states national deposit insurance funds only after those are depleted. The contributions to pay-outs and resolutions cases would be caped to limit the exposure of the common fund (European Commission, 2015).

In the co-insurance phase, the European deposit insurance fund would increasingly share (see Figure 3) the costs from the first losses.

The final phase would completely replace the national deposit insurance scheme and would be the sole insurance scheme for eurozone banks (Lange, 2017). It would cover all the liquidity needs and losses related to the deposit insurance function.

During the transitional period, the annual contribution of the banking sector to the EDIS fund would be on average around 0.1% of the covered deposits in the banking union. In the meantime, the national schemes would continue to co-exist alongside the EDIS, but the banks' required payment to the national deposit insurance funds would decrease. The contribution will be based on banks risk profile and would be set at European level compared to all other banks in the eurozone from the start of the co-insurance phase (European Commission, 2015).

8.7.2 Effect analysis of the European Deposit Insurance Scheme

The Commission presented a detailed effect analysis in October 2016. The effect analysis considers three alternatives of EDIS: mandatory lending, mandatory re-insurance and full insurance. Co-insurance was not analysed. The authors view it only as a transitional stage between re- and full insurance. All the considered options represent an improvement compared to the current legislation (national schemes with voluntary lending), however the objective of the banking union will be completely achieved only by the full insurance.

In the mandatory lending scheme, the national deposit insurance funds just provide liquidity up to a given threshold to other funds in the eurozone and aren't subject to any loss as all the loans must be repaid. On the other hand, the mandatory re-insurance and full insurance scheme are the same steady-state options as in the EDIS proposal.

The authors considered three criteria in their analysis: risk absorption, efficiency and cost neutrality, and limits on moral hazard. To test the risk absorption capacity of the schemes (both in term liquidity and loss), the authors used bank stressed scenarios[4]. The full insurance outperforms both other scenarios, while the

[4]The study uses unconsolidated balance sheet data of the European banks extracted from Bankscope dataset. It calculates the probabilities of default through the SYMBOL (Systemic Model of Banking Originated Losses) model developed by the European Commission's Joint Research Center. This model simulates how shocks affect each bank and then aggregates the data to see the impacts on the schemes. Both the immediate liquidity coverage ability and the long-run loss absorption capacity were tested (European Commission, 2016)

re-insurance provides better coverage than the mandatory lending. In terms of efficiency, the common fund offers the most balanced redistribution across euro area banks (European Commission, 2016). Nevertheless, all the options are cost neutral since they don't put additional burden on the financial sector. Against moral hazard, mandatory lending offers the most protection by not sharing the losses. The re-insurance also provides some protection by contributing only after the national funds are depleted and capping the maximum amount of contribution to the national funds' needs.

In another study, which was prepared and commissioned by the European Parliament in April 2016, the authors test the resilience of the Banking Union framework and identify the missing elements and the costs associated to them (Nieminen et al., 2016). The study suggests, that in the event of a new sovereign debt crisis, a common deposit insurance scheme would decrease the effect of deposit flight by about €16 billion, and in case of a financial crisis by €49 billion. Furthermore, in case of a major crisis, even if the Banking Union architecture fully in place today with the EDIS and SRM, the framework would not be sufficient to adequately mitigate the wide-ranging impacts without bailouts.

9 Comparison of policy options

I assess and compare the above discussed options per the three defined objectives: credibility, consistency, and risk-sharing. The four relevant policy options are credit line to national funds, re-insurance, co-insurance and full insurance. All the four options represents an improvement compared to the baseline scenario. In the analysis, I focus on the incentive compatibility of the schemes and on the welfare effects. Furthermore, as there is a trade-off between risk-sharing and moral hazard, I discuss these issues together.

Credibility

The scheme should be credible mainly by having an adequate size fund and sound fiscal back-stop.

The credit line to the national funds option would establish a robust fiscal back-stop and satisfy the liquidity needs, however the losses eventually must be covered by the national funds, which absolute size is still negligible compared to a costs of major crisis. By comparison, a common fund combined with a fiscal back-stop could be more credible in case of large, asymmetric shocks. It could more effectively cover the failure of the banking sector of some member states. All the re-, co- and full insurance would mean improvement compared to the credit line to the national funds scheme. The full insurance scheme would be the most credible since it would have the largest common fund, while the re-insurance is the least by having the smallest supranational compartment.

Consistency

The scheme should be consistent and be able to make swift decision. It needs to have an effective supranational governance to avoid conflicts with the also supranational supervision and coordination failures arising from the bankruptcy of the large cross-border banks.

The credit line to the nation funds scheme would still able to make swift decisions, however without any supranational part of the deposit insurance, the consistency problem still prevail. To ensure consistency, a central body should be set up to coordinate actions and make swift decisions. All the re-, co- and full insurance would ensure consistency; however, the re- and co-insurance would carry operational risk since these schemes would be overly complicated.

Another aspect of the good governance is the decision-making capacity of

the fiscal back-stop. The ESM in its current form would be able to make decisions only cumbersomely. The ESM treaty should be modified to attach this mechanism directly to a common fund (Véron, 2015).

Risk-sharing and moral hazard

The scheme should share the risks to break to adverse feedback loop between banks and sovereigns, to decrease the fragmentation of the banking sector, and to increase the credibility of the scheme.

Nevertheless, the design of a common deposit insurance scheme must balance between risk-sharing and moral hazard. Alternatively, measures should be implemented to reduce negative incentives or the capability of member states and banks to take higher risks. Otherwise, extensive risk taking can lead to further crises in the future.

In the credit line to the national funds option, the cost of failures will remain in the country and the losses of the funds must be borne by the domestic banking sector. The other three option would pool the risk to more effectively protect against major crises. The re- and co-insurance would have a national part to limit the negative incentives by the incomplete coverage (Shavell, 1979). The full insurance would mean complete risk-sharing arising from covered deposits. However, to handle the adverse incentives of the member states and banks some prerequisites should be implemented. First, the legacy problems, such as the NPLs and the domestic sovereign bond exposure should be solved. Then measures should be implemented to approximate the banking sector's diverse risk levels per member states. Macroprudential policies affecting the banking sector must be unified.

Overall, the full insurance scheme would be the most ideal option, however measures should be implemented to limit the moral hazard. Partial fulfilment of prerequisites would make feasible to implement either re- or co-insurance. Without satisfactorily handling the legacy problems, the credit line to the national funds option should be installed.

10 Implementation

A common deposit insurance scheme must have democratic legitimacy and accountability. Thus, it should be regulated per the European law and be held accountable to the European Pairlament. The amendment of the Single Resolution Mechanism's regulation would be sufficient to establish a common deposit insurance scheme. There is no need for an Intergovernmental Agreement since the EU Treaty provides adequate legal basis for the regulation (European Commission, 2015). It is important that the common deposit insurance will be built up on a solid legal framework to ensure a robust institutional scheme.

Nevertheless, from an economic point of view, the most important question is how to set up an incentive compatible scheme. Should the European Central Bank govern the newly formed deposit insurance scheme or an expanded Single Resolution Fund should be responsible for it? What should be the reach of the scheme? Or what should be the timetable of the implementation to already be in operation for the subsequent major crisis without covering the current legacy problems? These questions should be answered carefully to create a well-functioning scheme.

10.1 Transition

The common deposit insurance scheme should be set up gradually to ensure a continuous and incentive compatible operation. The transfer of functions from national funds to the European one should be neutral without any winners or losers. The prerequisites, and especially the legacy problems should be solved during the transitional period. The re- and co-insurance forms are great ways to cover this period. They ensure both continuity by gradually allocating responsibilities between the national and European funds and incentive compatible operation by keeping a national part thus limiting the moral hazard. Furthermore, not yet all the national funds are set up as required by the European Union's Deposit Guarantee Scheme Directive which again should be done before the full insurance phase (European Parliament, 2014a). The European Commission's proposal of the EDIS calculates with a 8 years of transitional period. 3 years of re-insurance, 4 years of co-insurance and then full insurance by gradually decreasing the responsibility of the national part (European Commission, 2015). The contribution caps in the re- and co-insurance schemes ensure that the common fund won't exhaust during the transition period. Faster handling of the legacy problems (NPLs and sovereign bond exposure) would

enable an even shorter, 3-5 years transition period (Gros & Schoenmaker, 2014).

10.2 Separate or combine deposit insurance with resolution

A common deposit insurance should be able to make swift decisions and have good governance to be accountable and effective in coordinating actions. There is a policy debate ongoing whether to combine the deposit insurance with the single resolution function (Schoenmaker & Gros, 2012). Both in the United States and in Japan these two functions are combined. The combination of the two function would avoid conflicts between multiple agencies and could apply internally the least cost principle in bank resolution. In resolution, the authorities need to choose between to take over (and further operate the bank) or to liquidate (and pay-out depositors) (European Commission, 2010). In a combined form, interventions such as recapitalization or liquidity assistance might be a less costly solution and are more often considered. These measures help to avoid contagion and maintain the operation of banks thus eventually might the pay-out of the depositors is not necessary and even depositors with deposits over €100,000 would not lose their uninsured share.

Primarily, the deposit insurance scheme and the resolution mechanism complement each other to protect depositors thus their cooperation would be advisable since their operation produce synergies (Schoenmaker & Gros, 2012). Beck and Laeven (2006) also found in their large sample, cross-country empirical study that separate deposit insurance and resolution mechanism can lead to inefficiencies and co-ordination failures in bank resolution. On the other hand, if the two function is combined, it can increase the stability of the banking system.

10.3 Governed by a separate authority or European Central Bank

Another policy question is whether a common deposit insurance (and resolution) scheme should be integrated into the European Central Bank. As shown by a recent World Bank study, in most of the countries the deposit insurance scheme is a legally separate unit from central banks (Demirgüç-Kunt et al., 2013). The theoretical argument in favour of a unique body is that information sharing about the state of the economy and the banking sector will be smoother. However, the integration may lead into excessive forbearance in bank resolution (Freixas & Rochet,

2008). Repullo (2000) discusses this delegation problem extensively. He applies an incomplete contract approach and argues that when the central bank (as a liquidity provider) and a deposit insurance scheme are integrated, it is less likely that the agency will decide to close a failing bank as vigorously as a stand-alone deposit insurance scheme would act to protect depositors. Especially in case of large shocks would the separation of the two authorities be optimal for the society. Furthermore, since the ECB has also supervisory roles, it could create further conflicts . The ECB may be subject to reguklatory capture and fear to act as a resolution authority to avoid provoking panics in the market (Gros & Schoenmaker, 2014).

Thus, an independent common deposit insurance (and resolution) scheme would be more optimal and could be established by European Union Regulation and be accountable to the European Parliament. Similarly to the Single Resolution Board (responsible for the operation of the Single Resolution Fund), a common deposit insurance scheme could function as an independent agency (or combined and supervised by SRB) based in Brussels, Belgium.

10.4 Scope of the common deposit insurance

A further policy question to be decided is whether all eurozone banks or only those which are directly supervised by the Single Supervisory Mechanism should be covered by a common deposit insurance. The SSM supervises the most significant, systematically important banks with substantial cross-border activity in the euro area, and only oversees the supervision of the smaller financial institutions. To have an incentive compatible scheme, it is important to keep the same geographical scope for the supervision and deposit insurance functions. However, it is also the SSM's responsibility to assure that all the banks are supervised per the common high standards and it has the power to directly take over the supervision of smaller banks (Schoenmaker, 2015) thus even if all banks would be covered by a common deposit insurance scheme that would be consistent and incentive compatible system. Furthermore, massive failure of the smaller banks in a systematic crisis still could trigger a bank panic and have substantial adverse effect on sovereigns. In such a setting, there would be less diversified pooling of risks and smaller fund which would make it substantially harder to handle a crisis. Without a supranational insurance, these smaller financial institutions would partly preserve their national identity. Moreover, the banks just under or above the threshold to participate in the common deposit insurance would raises several operational problems (Gros & Schoenmaker,

2014). Thus, a common deposit insurance for all the eurozone banks would be more optimal.

11 Conclusion

A common deposit insurance scheme is the necessary, last element of the banking union to genuinely break the vicious circle between banks and sovereign.

Nevertheless, to have a robust and incentive compatible European deposit insurance system, it should fulfil the following objectives. It should have significant size to credibly protect in case of large bank failures, be consistent (supervision and deposit insurance on the same supranational level) and pool the risks to lessen the fragmentation of the financial system across the eurozone.

Currently, the only feasible solution is either the mandatory lending between the national deposit insurance funds or to indirectly link the ESM to the national funds to provide credit because these options does not share risk between member states. In medium-term (2-5 years) the optimal solution depends on the fulfilment of prerequisites to cope with moral hazard. The necessary prerequisites are related to the different macro-prudential policies and to the legacy of the recent crisis. Banks' risks profile is still different across Europe to a certain degree because of their domestic sovereign bond exposure and the varying amount of non-performing loans. These problems should be handled before any substantial risk-sharing between member states. Partial fulfilment of prerequisites would make feasible to implement a re- and co-insurance scheme. However, the ideal solution would be the full insurance for the eurozone to fully break the sovereign-bank loop. Thus, the introduction of re-insurance should be the medium-term goal, full insurance a medium- or long-term goal depending on the execution of the prerequisites.

A common deposit insurance should be established by gradually taking over the role of the current national deposit insurance schemes and directly levying the risk-based premiums on all the eurozone banks to build up its fund. This could be done cost-neutrally since the premiums to national funds would decrease in the meantime and finally cease after the end of the transition period. The common scheme should be independent from the European Central Bank, however should be managed jointly with the Single Resolution Fund. Moreover, a credible fiscal back-stop should be attached to it. The ESM could serve as a fiscal back-stop, nevertheless in an optimal case its treaty should be changed to be able to directly give liquidity to the common fund.

The European Commission also realized the need for a common deposit insurance and proposed the European Deposit Insurance Scheme (European Commission,

2015). Compared to this proposal I would suggest broder emphasize and measures to limit the potential moral hazard which on the long-term seriously can affect the viability of the scheme and the cohesion of the European integration. These measures should handle the legacy problems (NPLs and soveregin bond exposure) and unify the different macro-prudential policies which affect the banking sector's risk level. In addition, I suggest to modify the ESM treay to be able to directly lend to the common fund to increase its credibility.

A common deposit insurance can contribute to a more integrated and resilient European financial system. Furthermore, in crisis management, it would also consider the cross-border externalities.

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13 Figures and tables

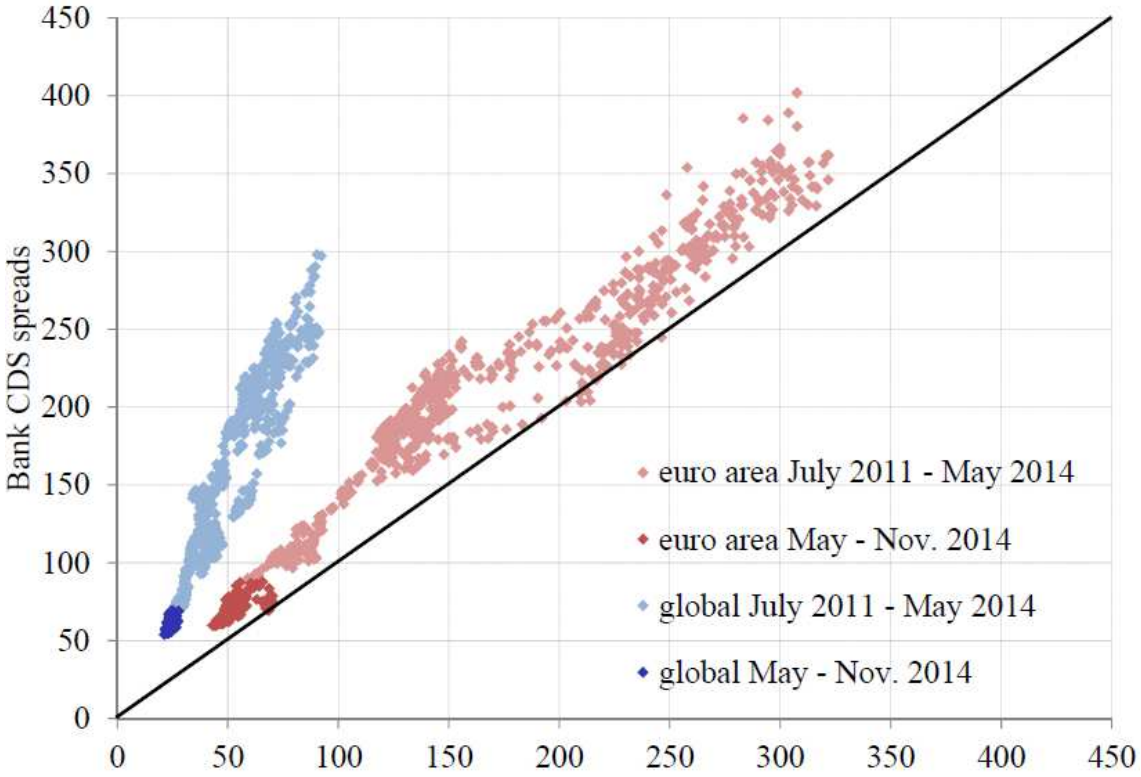

Figure 1: Sovereign and bank CDS spreads

Source: European Central Bank, 2014

Note: July 2011 – 14 Nov. 2014; basis points. Average CDS spread for euro area and global large and complex banking groups (LCBGs) versus the average sovereign CDS spread where the LCBGs are headquartered (France, Germany, Italy, Spain and the Netherlands for euro area LCBGs and the United States, the United Kingdom, Switzerland, Denmark, Sweden and Japan for global LCBGs)(European Central Bank, 2014)

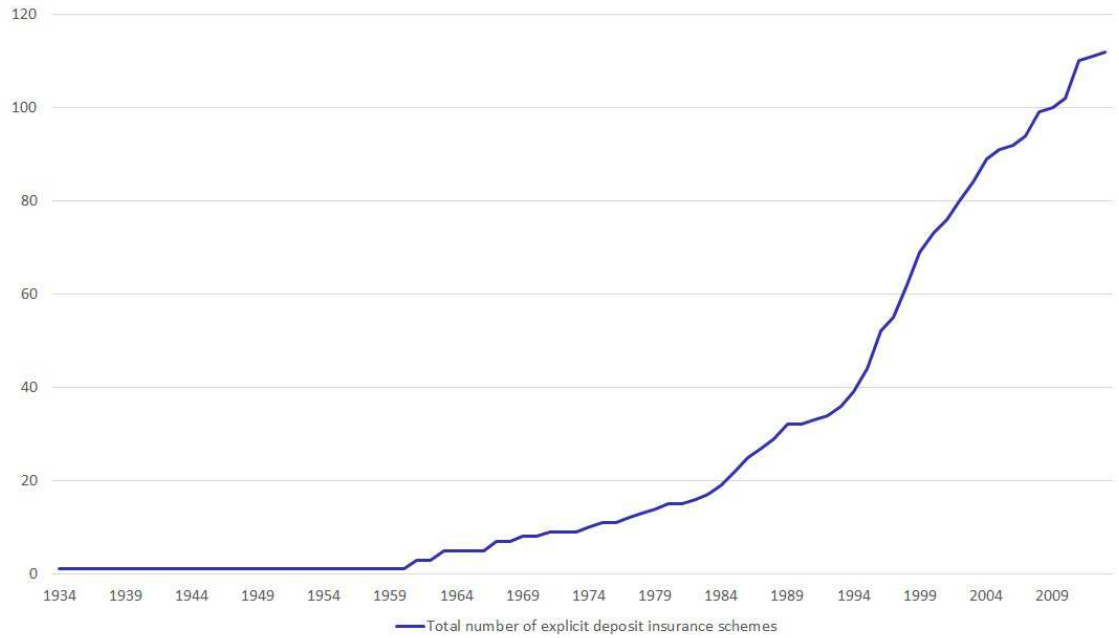

Figure 2: The number of explicit deposit insurance schemes worldwide, 2013

Source: Demirgüç-Kunt, Kane & Laeveno, 2013

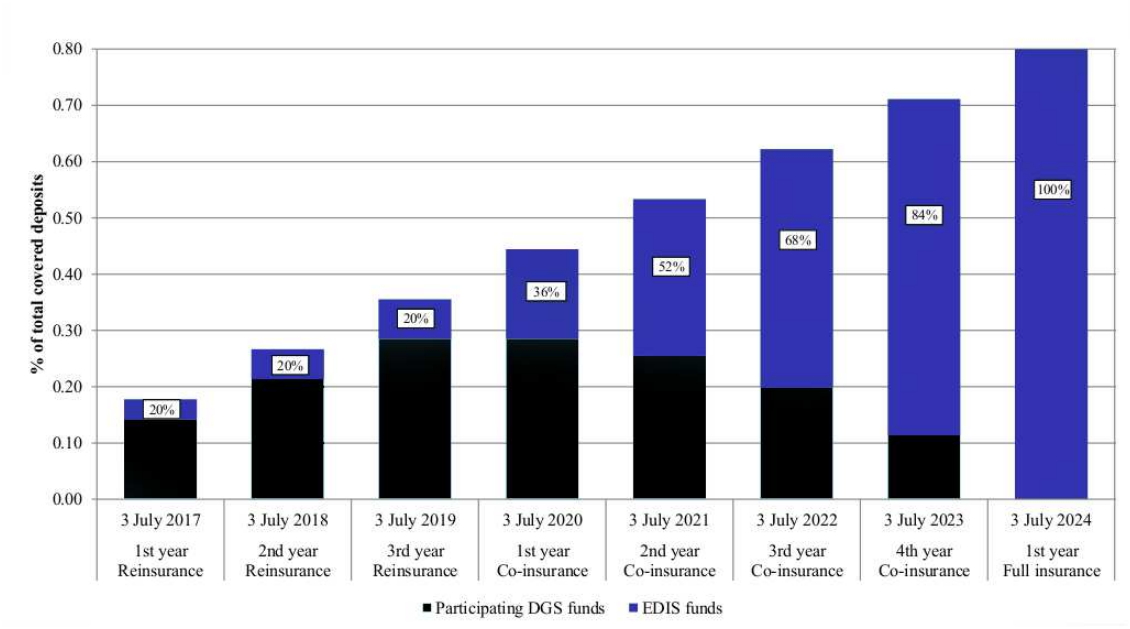

Figure 3: Evolution of EDIS funds compared to the funds of a participating DGS

Source: European Commission, 2015

Table 2: Top 25 banks in banking union in 2014

	Banking groups	Total assets (in billion)	Of which: home	other EU	third country
1	BNP Paribas (FR)	€ 2,077	34%	44%	22%
2	Crédit Agricole (FR)	€ 1,762	80%	10%	10%
3	Deutsche Bank (DE)	€ 1,708	29%	28%	43%
4	Société Générale (FR)	€ 1,308	72%	14%	14%
5	Banco Santander (ES)	€ 1,266	26%	40%	34%
6	Groupe BPCE (FR)	€ 1,223	90%	2%	8%
7	UniCredit (IT)	€ 844	43%	51%	6%
8	ING Bank (NL)	€ 828	36%	50%	14%
9	Crédit Mutuel (FR)	€ 706	89%	8%	3%
10	Rabobank (NL)	€ 681	75%	6%	19%
11	Intesa Sanpaolo (IT)	€ 646	87%	10%	3%
12	BBVA (ES)	€ 632	43%	16%	42%
13	Commerzbank (DE)	€ 557	50%	34%	16%
14	DZ Bank (DE)	€ 402	76%	16%	8%
15	ABN AMRO (NL)	€ 387	75%	15%	9%
16	La Caixa Group (ES)	€ 339	89%	10%	2%
17	Landesbank Baden-Württemb. (DE)	€ 266	76%	16%	8%
18	KBC Group (BE)	€ 245	52%	43%	5%
19	Bankia (ES)	€ 242	86%	13%	1%
20	Bayerische Landesbank (DE)	€ 232	77%	15%	8%
21	Banque Postale (FR)	€ 213	93%	7%	0%
22	Nord LB (DE)	€ 198	84%	12%	4%
23	Erste Group (AT)	€ 196	46%	52%	2%
24	Belfius (BE)	€ 194	71%	24%	5%
25	Banca Monte dei Paschi (IT)	€ 183	94%	6%	1%
	Top 25 Banking Union	€ 17,335	59%	24%	17%

Source: Schoenmaker, 2015

Note: Top 25 banks are selected on the basis of total assets. Assets are divided over home country, euro area and rest of the world.

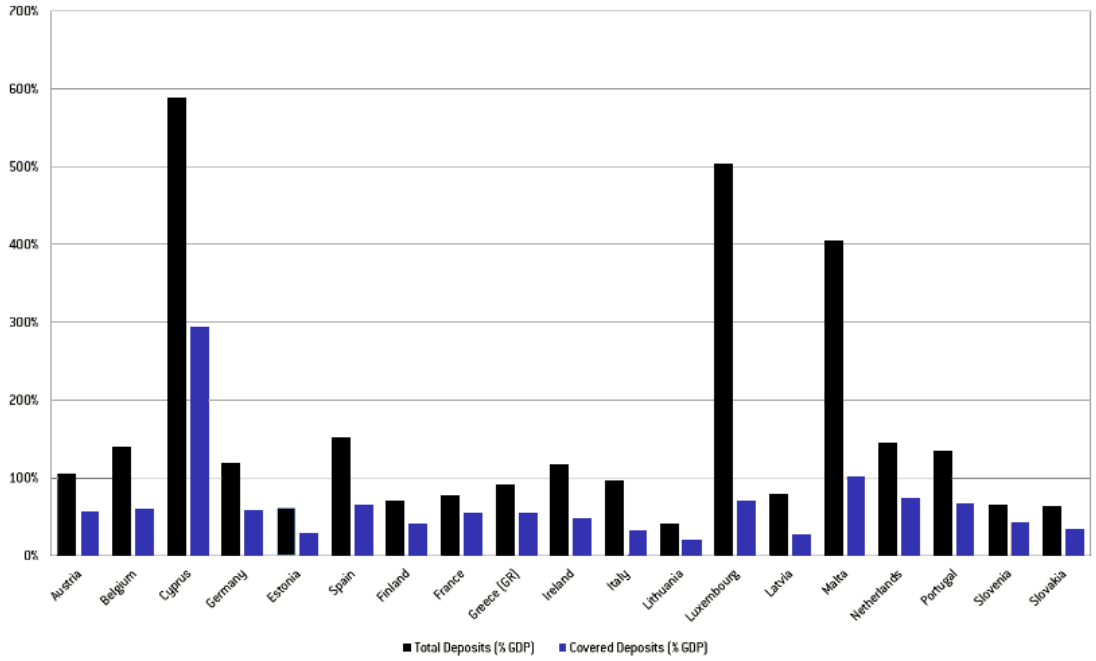

Figure 4: Total and covered deposits as a percent of GDP in 2012

Source: Cannas, Cariboni, Veisari, & Pagano, 2015